

HORTICULTURAL ABSTRACTS

Vol. 29, 1959



Prepared by
COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS,
EAST MALLING, KENT

Published by
COMMONWEALTH AGRICULTURAL BUREAUX, FARNHAM ROYAL,
BUCKS, ENGLAND

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PRINTED IN GREAT BRITAIN BY HEADLEY BROTHERS LTD
109 KINGSWAY LONDON WC2 AND ASHFORD KENT

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PUBLICATIONS

1. *Periodical.* Horticultural Abstracts.
2. *Occasional.* Technical Communications and Digests.

Occasional Publications issued in 1958

Technical Communication 25. Abstract Bibliography of Fruit Breeding and Genetics to 1955. *Rubus* and *Ribes*—A survey.

Technical Communication 26. Horticulture in the British Commonwealth—An Outline 1958.

Digest No. 1. The Bulk Harvesting of Orchard Fruit.

For details see back cover.

HORTICULTURAL ABSTRACTS

Vol. XXIX

MARCH 1959

No. 1

Initialled abstracts and reviews not by Bureau staff are by J. E. Crosse, D. W. P. Greenham, and E. Keep of the East Malling Research Station, and by Sir Frank L. Engledow, G. St.C. Feilden and J. R. Llewelyn.

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EDITORIAL NOTES

Eheu fugaces . . . labuntur anni

Which, being interpreted for those few who may chance to have forgotten their Greek and other antique fancies, suggests that old age is a terrible thing. But it is far from terrible for the readers of a journal, since it ensures eventually a change of editor.

From 1931 the present hack in chief, compiler, or editor has struggled to maintain a flow of comparatively intelligible abstracts from a mass of original articles frequently distinguished more by erudition than clarity.

Being endowed with more native wit than critical faculty or originality of concept he has during a long period tried to keep abreast of the times by encouraging and adopting suggestions for improvement made both by readers and by the staff of the bureau. The result is the journal as you know it today, still far from perfect.

Over the years almost all things in the journal have risen, its cover, its bulk, its price, its subscribers. Its legibility, diminished by the enforced adoption of a smaller fount in June 1942, was slightly improved in 1949, and now, at last, in March 1959 has been restored to its original 10 point fount standard.

What of its quality? A final word from the retiring editor. Now is your chance to make really creative suggestions with regard to the future of the journal. It is the function of a new broom to sweep vigorously, so give power to his elbow while he is still in a keen receptive state and write to him forthwith.

NOTES OR BIBLIOGRAPHIES AVAILABLE

Information is available on the 37 subjects noted below. Copies of these have already been sent to the original enquirer and one copy can now be sent gratis to any one address so long as the supply lasts.

Please write direct to us [NOT to C.A.B., Farnham Royal] and merely quote the Query File No.

Query File No.	Subject.	Information given.
3292	Notes and bibliography on <i>Pierce's disease of vines with special reference to host plants</i>	22 pp. notes + 10 references
3298	Annotated bibliography on <i>Ipecacuanha</i>	25 references
3300	Annotated bibliography on the Effects of soil temperature on plant growth	60 references
3304	Bibliography on Fruit growing in New Zealand	57 references
3315	Some data on the Composition of avocado leaves [from articles by Aldrich, Cameron, Haas and others]	4 pages
3316	Translation of Russian article by Dobroljubskij and Slavov in <i>Vinodelie i Vinogradarstvo</i> , 1955, No. 6, p. 43, on the Foliar nutrition of vine with the micro-element chromium	2 pages
3318	Annotated bibliography on <i>Cyperus</i> species as weeds (nutgrass) and as cultivated plants	125 references
3322	Annotated bibliography on Mineral deficiency symptoms in coffee	10 references
3322a	Tabulated data on Trace element contents of coffee leaves reported in recent literature	3 pages
3327	Bibliography on the Composition and chemistry of bordeaux mixture (1939-58)	25 references
3328	Abridged translation of Russian article by Grušvickij in <i>Bot. Zhurnal</i> , 1956, 41: 1021-3, on Methods for accelerating the germination of ginseng seed	2 pages
3330	Abridged translation of German article by Steffen in <i>Gartenwelt</i> , 1956, 56: 45-6, on the Mechanical planting of tulips	1 page
3331	Annotated bibliography on the Chemical composition of vegetable crops with special reference to minerals	149 references
3338	Annotated bibliography on Potassium nutrition of tomatoes	42 references
3338a	Annotated bibliography on Factors affecting the dry matter content of tomato fruits	13 references
3346	Translation of French article by Grosclaude in <i>C.R. Acad. Sci. Paris</i> , 1958, 246: 1273-4, on Production of pectic enzymes in response to environment and of polyphenol-oxidase by <i>Stereum purpureum</i> Pers.	2 pages
3350a	Annotated bibliography on the Seasonal responses of cuttings to rooting	24 references
3350b	Annotated bibliography on the Use of sugar solutions as an aid in rooting cuttings	13 references
3354	Notes and bibliography on Weed control in fruit and ornamental tree and shrub nurseries	6 pages + 50 references
3355	Notes and bibliography on Gibberellins and gibberellic acid	14 pages + 34 references
3356	Annotated bibliography on Narcissus eelworms and their control	58 references
3356a	Supplementary bibliography on Narcissus eelworms and their control	54 references
3367	Annotated bibliography on Cobalt found in, and applied to, horticultural plants	31 references
3372	Notes and bibliography on Growing bamboos for possible use as harvesting poles	2 pages + 7 references

<i>Query File No.</i>	<i>Subject.</i>	<i>Information given.</i>
3375	Notes and bibliography on Propagation of mango, papaw, avocado, langsat, citrus and coffee by cuttings, and of mangosteen by grafting	4 pages + 42 references
3379	Bibliography on the Application of nutrient elements, other than N, P and K, to sugar cane	69 references
3381	Short descriptions and bibliography on some Ornamental plants suitable for planting in sub-tropical coastal regions	4 pages + 6 references
3383	Annotated bibliography on African marigolds (<i>Tagetes</i> spp.) and other plants grown for the suppression of nematodes	12 references
3392	Annotated bibliography on Heat treatment of vegetable seeds	15 references
3394	Abridged translations of articles on some aspects of Chinchérinchee [<i>Ornithogalum</i>] culture	2 pages
3399	Bibliographies on Mulching vegetable crops with (1) aluminium foil (2) plastic films	10 references 18 references
3400	Annotated bibliography on Pre-forcing treatment of hydrangeas	19 references
3406	Annotated bibliography on Shade for cacao and coffee	109 references
3409	Annotated bibliography on Magnesium deficiency in tomatoes, its cause and control	21 references
3415	Notes and bibliography on Boron requirements of carrots with particular reference to deficiency symptoms	1 page + 7 references
3418	Bibliography on the Absorption, metabolism and translocation of N, P and S	107 references
3438	Annotated bibliography on Breeding and selection for earliness in tomatoes	33 references

SALIENT ITEMS, Vol. 29, No. 1.

GIBBERELLIN GYMNASTICS

General:—In 1955 we recorded 2 papers which described the growth-promoting effects of a group of compounds known as gibberellic acid or gibberellin(s) (GA). In 1956, 6 such papers were recorded; in 1957, 27; in 1958, 111; and now in the first quarter of 1959 there are more than 40 contributions. These figures, of course, only represent a fraction of the total outpourings on these curious fungal by-products. Their effects on forest trees and on field crops and pasture grasses are being recorded by our colleagues at Oxford and Hurley. In the background there are teams, or should it be coveys, of chemists analysing, synthesizing and producing neat little rings sprouting bits of carbon in various positions. As data pile on data the problem of how to absorb and make intelligent use of it grows more and more acute. Is the stage approaching when the only solution will lie in the declaration of an international sabbatical year for plant physiologists to be devoted solely to meditation and the integration of ideas? Or could some of them be persuaded to turn their attention to less spectacular but possibly more important problems, such as the interrelationships that exist between shoot and root growth and reproductive processes? Meanwhile, here are some notes on the latest batch of GA papers:—

Review:—Two brave spirits have found the time and energy to condense the data from 204 articles into a mere 43 pages (71p).

Types of GA:—In addition to 4 or more basic types of GA, designated in Britain A₁, A₂, etc., there are now various derivatives, all of which may have different effects on plants (59, 60). As though this were not enough there are now several "Soviet gibberellins", two of which have been extracted from actinomycetes and have also been named A₁ and A₂, while others obtained from yeasts and a fungus have been called D and G (61). Do not forget that plants too are full of "gibberellic-acid-like" substances (51).

Seed responses to GA:—Direct and synergistic stimulation of seed germination is recorded in several papers (25, 101, 496). Treated seeds appear to respire more freely (54, 594).

Effects of GA on growth and reproduction:—Dormancy breaking of buds, stem elongation and the encouragement or suppression of flower formation are among the responses recorded on numerous plants (6, 28, 43, 53, 55, 113, 453, 454, 499, 556, 700, 701, 796, 890).

Physiological effects of GA:—Interactions between GA and other growth substances are almost as numerous as the papers that describe them (45, 50, 52, 56-58, 686, 702). Interactions between GA and light are also described (25, 28, 29), as are the effects of GA on abscission (455).

GA and plant diseases:—GA may be of use in counteracting the stunting effects of some viruses (234) and may also be useful in stimulating growth in dormant detached twigs used in a new and economical method of indexing fruit trees for viruses (233). On the other hand, plants treated with GA may sometimes become more susceptible to fungus diseases (427).

Consolation for readers concerned with growing crops:—One of the papers referred to above (6) makes the suggestion that GA stimulation of growth might have a practical application for crops growing under marginal weather conditions. It also seems possible to use it to produce larger and more lasting geranium flowers (707), brighter and juicier oranges (805) and tobacco of better quality (593).

CLIMATIC FACTORS

General:—Only 2 out of 21 meteorological factors examined were shown to have a decisive effect on apple yields in the Nelson district of New Zealand (104).

Relative humidity:—This much neglected factor, which, if it is recorded at all, is usually measured only once a day at a time when it is normally high, is on this occasion mentioned in several papers. One of these shows that plants growing at a low R.H. need several times as much water as plants growing at a high R.H. to reach the same size (691). On the other hand, if the R.H. is very high, transpiration may be reduced to a point at which growth is brought to a standstill (21). Where a tomato crop is irrigated, the R.H. of foliosphere may be affected for up to 5 days (539). Where phosphorus sprays are applied to leaves the uptake of P may be affected by the R.H. (38).

Other aspects of water:—Several papers indicate or imply that the water requirements of crops alter with successive growth stages (477, 489, 590, 591). Although under conditions of water stress plant growth and carbohydrate formation decline, the movement of carbohydrate from mature leaves and through the phloem is accelerated (23); this finding may well have a bearing on problems of flower bud induction and root growth.

Light:—Although man can do little to control light conditions at all accurately, except in glasshouses, many plant physiologists appear to be drawn to it like moths to a candle (24-29, 144, 492, 497, 498, 565, 647, 741, 758, 907, 934). Where lighting is a practicable proposition, however, it is of help to know whether to install incandescent or fluorescent lamps (690, 698) and what intensities and durations of lighting to use to make crops mature at the right season (710, 760, 766).

Warm temperatures:—With grape vines temperatures during the fortnight after flowering can affect the size, seediness and composition of the grapes at harvest time (196). Temperatures also have a marked effect on the speed of seed production by carrots (483) and on the amount of seeds produced by flowering stocks (712).

Cold temperatures:—In hydrangeas exposure to cold alters the relative concentrations of amino acids (761). New approaches to the problem of determining and defining cold hardiness are described for apples (106, 226) and chrysanthemums (703).

GROWTH AND PHYSIOLOGY

The previous crop:—Various fresh plant residues release substances toxic to tobacco plants (568). Peas depress a succeeding lucerne crop in proportion to their population and yield (452).

Shoot growth:—In one apple variety the 12th leaf from the base of each shoot is small and marks the division between growth based on food reserves and growth based on new food supplies (111).

Fruit development:—In date fruits specific pollens may affect cell number in the early stage of development, whereas fruit thinning may result in cell enlargement during later stages (843). In grapevines removing the tendrils may sometimes increase bunch weight (205). In avocado pears late harvesting tends to accentuate biennial bearing (782).

Defoliation and abscission:—How to do it with chemicals (138, 745, 751, 752) and the physiological processes involved (455).

Chlorophyll:—Both in fruit trees and tobacco chlorophyll contents change as the season progresses, and in the former it might be used to determine the best dates for harvesting (141, 599).

Growth substance tests:—One paper describes a new method of identifying translocated growth substances by combining observations of plant response with chromatography (49). Two others cast doubts on the accuracy of the present pea-section auxin bioassay, and one of them reveals that various fatty acid esters, including detergents, appear to have hormonal effects (45, 56).

Vitamins:—The old idea that “a little of what you fancy does you good” is clearly out of date. The fruits and vegetables of the future may taste of nothing, but at least they will be stuffed full of vitamins (8-10, 140, 146, 147, 157, 180, 181, 208, 209, 392, 412, 511, 521, 675, 909, 956-959 and probably others).

MACHINES AND EQUIPMENT

Harvesting operations:—Casting modesty aside we draw attention to our own semi-popular review of progress in the bulk harvesting of orchard fruit (979). Three other papers describe developments in this field (149-151), and a fourth indicates that similar methods are being developed by bean growers (468). Mechanical aids are also available for the handling of other vegetables and for raspberries (177, 394). For growers of sugar cane, who presumably, spell bulk with a capital B, there is a side loader which handles 400 tons a day.

Other machines:—The general is represented by an account of mechanical methods of planting New Zealand hemp (648), the particular by a unique high-pressure field-plot sprayer (67), a broadcaster for applying granulated insecticides (308) and a motor-driven water pump for dislodging aquatic weeds (332).

Apparatus:—Items described include a portable field growth chamber for winter injury studies (30), a device for culturing seed plants aseptically (71 l), a modified electric bird perch for protecting crops (305), and photographic devices for recording the growth of root tips and the transpiration of different parts of a single leaf (66, 546). Tests on a gauge that records soil moisture deficits have shown it to be an accurate guide to irrigation needs (68).

Glass and plastic houses:—All plastic materials tested so far are in some respects inferior to glass (65, 71o), but new types of plastic are constantly being developed (70a). A new tent-shaped lath house may interest readers in hot and sunny climes (69).

Drying crops:—There is a useful publication on processing copra (882). Tobacco is represented by descriptions of flue-curing barns (617) and hops by an account of drying studies (666). Freeze-drying is being tested as a pharmaceutical process for leaves of *Digitalis* species (635).

NUTRITION

Nutrient uptake, distribution and loss:—For vegetables growing in artificial media under glass little and often seems to be the best rule to follow in applying fertilizers (388). With tobacco the uptake of nutrients remains low for some weeks after transplanting (582). Papers that have a bearing on the interpretation of plant analyses include four, dealing, respectively, with apples, grapevines, rubber trees and sugar cane (142, 206, 913, 929). Studies with radioactive elements have thrown light on the various factors affecting the leaching of nutrients from leaves (37).

Nitrogen:—The effects of N and of irrigation on the growth and composition of avocado trees form the subject of a series of interrelated articles (775-781). Comparisons between different N sources are described in 3 papers, one of which makes the point that responses are likely to vary with soil temperatures (185, 490, 632). The many effects of deficiencies of carbohydrates and N on flower and fruit development in several crops is also reported (436).

Phosphorus:—Effects on apples of P concentration in culture solutions (126); effects on early yields of tomatoes of fertilizer placement (527); interactions between P and Fe in tobacco nutrition (589); and a detailed study of factors affecting the uptake of radioactive P by leaves (38).

Trace elements:—These affect the distribution of sugars in strawberry plants (186) and the composition of proteins formed in beans (458).

PLANT PROTECTION

Fungi and bacteria:—The extent to which a leaf spot disease can reduce the starch reserves of a plant is clearly shown in a study on the control of blackspot of roses (749). Bean plants attacked by fungi produce an antibiotic or defensive substance, which has been named phytoalexin (31, 32). Other possible defence mechanisms include gentisic acid and certain constituents of leaf cuticle waxes (7, 108). The treatment of plants with certain amino acids reduces their susceptibility to fungus attack (398). Irradiation with electrons and infrared rays shows promise of controlling *Botrytis* diseases of harvested grapes and onions (271, 480), but a more convivial

picture is presented by an account of oenside, an anthocyanin pigment which becomes a powerful bactericide in matured red wines (212).

Viruses:—Big-vein of lettuce is described as a soil-borne virus disease (503), but it may in fact be caused by some substance produced by a fungus (502). In pears decline symptoms attributed to viruses may only show up if other factors, notably incompatibility, are present (231). Among chemicals which may reduce virus infection or enhance host resistance are Cytovirin and certain polyelectrolytes (610, 611).

Nematodes:—First use a simple and practical method to find out if you have a nematode problem (277); then, if you do have one, apply DCP to any planting holes you may prepare for fruit or ornamental trees (280). Alternatively, if you happen to know what species of nematode is involved, you can experiment with asparagus juice or maleic hydrazide (407, 597).

Mites:—The transpiration of citrus leaves is affected by mites feeding on them, but there are surprising differences in the responses shown by different species of citrus (822).

Chemicals:—Transpiration of citrus leaves is also drastically reduced for some weeks by oil sprays (827), a discovery that could have a bearing on problems that are not directly concerned with pest control. Chlorophyll may be used to reduce the phytotoxicity of Acti-dione to beans (463). In carrots aldrin may be partly converted into dieldrin and thus upset the calculations of residue analysts (486). Acaricides and insecticides that receive special mention include Amiton, Tedion and Ethion (286-288).

PROPAGATION

Seeds:—Factors affecting the germination of viburnum seeds are considered in some detail (771, 772). With date seeds quite low concentrations of common salt can inhibit germination (840). Factors affecting the usefulness of mercury seed dressings include the temperature at which seeds are kept after treatment and the steps taken to remove excess mercury (673, 713).

Cuttings:—With roses the rooting capacity of cuttings shows seasonal variation and is dependent on the proportions of the different sugars present (744). With holly the time of taking cuttings does not seem to be important, provided that a piece of old wood is left as a heel (759). With softwood cuttings of *Prunus* rootstocks treatments that may enhance rooting include antitranspirant sprays, the addition of nutrients to IBA and the repetition of IBA treatments at 2- or 3-week intervals (99). With cuttings of several plants the effectiveness of a growth substance, P604, may vary with temperature (685). With tea cuttings soil pH (or could it be structure?) appears to affect both root and callus formation (948).

Stooling:—How to obtain additional apple rootstocks after the original stock has been budded (86).

Grafting:—New edition of "The grafter's handbook" (970).

Rootstock-interstock-scion relationships:—Detailed evidence is advanced to support the hypothesis that incompatibility between pears and quinces is due to the presence of a cyanogenic glucoside, prunasin, in the quince stocks (94). Incompatibility between lemons and trifoliate oranges may, however, be due to a toxic substance produced by the lemon scions (791). Other studies of interest include the responses of a single rough lemon or trifoliate orange scion to both these species used as rootstocks simultaneously (790), and investigations on interstocks used for apples, which suggest, among other things, that dwarfing results from reduced water conduction through the interstock xylem (88).

MISCELLANEOUS

Paints and preservatives:—Often phytotoxic when applied to greenhouse woodwork or pots (63, 464).

Pea problem:—Satisfactory procedure evolved for variety trials (446).

Penetration:—Into plants and fruits by means of X-rays (195, 442, 548).

Performance:—Of cacao clones, varying with year of planting and initial plant size (863).

Pigments:—Are the red pigments of plants anthocyanidins or humic acid (11)?

Pruning:—For citrus mechanized pruning has proved its worth (804).

Publications:—Three by the Bureau in one month—a record, but not to be regarded as a precedent (962, 973, 979).

MISCELLANEOUS.

General.

(See also 71g, 962, 963, 965, 974, 976, 980, 981, 984-987, 989-991, 993-995, 997-1000, 1004, 1006.)

1. BENNETT, L. G.

Fresh fruit and vegetables statistics in Britain.
Reprinted from *Bull. Oxf. Univ. Inst. Statist.*,
1957, 19: 271-7, bibl. 11.

The purpose of this paper is to point out some of the shortcomings of the background statistics published by the Ministry of Agriculture in the U.K. on the production, distribution and consumption of fruit and vegetables. Import figures are reasonably accurate, but doubts exist concerning estimates of home production, consumption and wastage and the extent to which reconsignment (i.e. double wholesaling) is involved. These aspects are discussed with particular reference to a paper by G. R. Allen ("The reorganisation of fruit and vegetable wholesale marketing", *Ibid.*, 1956, Vol. 18, No. 4).—Dep. agric. Econ., Univ. Reading.

2. VAN NES, A. R.

De economisch optimale bedrijfsgrootte van gespecialiseerde tuinbouwbedrijven. (The optimum economic size of specialised horticultural holdings.)

Landbouwk. Tijdschr., 1958, 70: 570-8.

The optimum economic size of a holding is that where factors which stimulate and those which inhibit expansion are in equilibrium. The effects of increasing size on yields and costs are presented for a glasshouse tomato holding and a modern fruit farm.—Landb. econ. Inst.

3. MICHELSON, L. F., LACHMAN, W. H., AND ALLEN, D. D.

The use of the "Weighted-Rankit" method in variety trials.

Proc. Amer. Soc. hort. Sci., 1958, 71: 334-8, bibl. 3.

A method for the numerical evaluation of horticultural characters is described. As an illustration, characters of 10 early-yielding tomato hybrids are analysed.—Univ. Mass., Amherst.

4. JAŠA, B.

Některé problémy zahradnictví v blízkosti měst v souvislosti se zásobováním čerstvým ovocem a zeleninou. (Some problems of horticulture in the vicinity of towns in relation to the provision of fresh fruit and vegetables.) [Russian and German summaries $\frac{1}{4}$ p. each.] *Acta Univ. Agric. Silv., Brno, Ser. A*, 1957, No. 2, pp. 177-82, bibl. 7.

The requirements and availability of horticultural products in 3 large towns are discussed. Methods of improving the production of early and forced vegetables and small fruits through the use of waste

heat, purified waste water for irrigation and town refuse for composting are suggested.

5. HARA, N.

Study of the variegated leaves, with special reference to those caused by air spaces.

Jap. J. Bot., 1957, 16: 86-101, bibl. 22, illus.

Types of variegated leaves are divided into 4 groups, which distinguish 4 causes of variegation, and these groups are further sub-divided into 4 groups based on the parts of the leaf that are variegated. From studies on various plants, including several ornamentals, 3 factors found to be mainly responsible for the type of variegation caused by the presence of air spaces just beneath the epidermis are enumerated.—Univ. Tokyo, Hongo, Tokyo.

6. HUDSON, J. P.

Effects of weather on plant behaviour.

Nature, 1958, 182: 1337-40, bibl. 6, illus.

Since it is impracticable on a field scale to alter the temperature and daylength environment of the crop, the possibility was studied of altering the plant's response to its natural environment. Raspberry was used as a test plant because each sucker has a life cycle which can be divided into a number of discrete phases in each of which the apices behave in a different way. Under natural temperate conditions progression from phase to phase is mainly the result of changes in temperature and daylength. When elongating shoots grown at 18° C. and 12 hr. days are transferred to a lower temperature (10° C.) and shorter daylength (8 hr.), they normally form terminal rosettes of leaves within 2-3 weeks, slowly unfolding new leaves but with no elongation of internodes. If weekly treatments of gibberellic acid at low concentrations (1-2 µg. per plant) are applied to the stem apices immediately after the transfer, the internodes continue to elongate. Moreover, if GA is applied after rosettes have formed, the stems will start to elongate again at once. If the applications cease, the effect of GA wears off in a few weeks and the shoot again forms rosettes. Treatment of stem apices with GA also stimulates growth of the basal bud (which would not normally elongate till the following year), and the new basal shoot will continue to elongate even after treatment has ceased and the parent shoot has reverted to a rosetted condition. Heavier applications of GA (i.e., a single treatment with 200 µg.) caused very rapid and abnormal elongation of both the rosetted apex and the basal bud, the effect persisting for at least 3 months. Thus GA changes the reaction of the plant to its environment, in this case causing a shoot to grow under weather conditions which would normally prevent it from elongating. It is suggested that such chemical stimulation of growth might have practical application under marginal

weather conditions, particularly in spring to produce larger plants by the beginning of the growing season, capable of taking full advantage of seasonal improvements in the weather.—Univ. Nottingham Sch. Agric., Sutton Bonington.

Chemical composition.

(See also 70c, e, f, k, l, n, o, q, r, z, 71a, d, j, 139-147.)

7. GRIFFITHS, L. A.

Occurrence of gentisic acid in plant tissues.

Nature, 1958, **182**: 733-4, bibl. 8.

Gentisic acid (2:5 dihydroxy benzoic acid) was found in plants of 73 families. Its separation from other fluorescent substances is described with special reference to leaves of cacao, on which further studies are in progress. The extent to which the compound is present in plants is correlated with the degree of lignification, and its presence in surface tissues is possibly connected with disease resistance.—Imp. Coll. trop. Agric., Trinidad, B.W.I.

8. BOOTH, V. H.

The stability of carotene in vegetable foods and forages. [French and German summaries $\frac{1}{2}$ p. each.]

Qual. Plant. Maveg., 1958, **3/4**: 317-26, bibl. 23.

A review, with special reference to preservation and storage of carrots, green vegetables and apricots, also to colour retention in the corona of *Narcissus recurvus* flowers.—Dunn nut. Lab., Cambridge.

9. BOUKIN, V. N.

Notes on the study of vitamins in plants. [French and German summaries $\frac{1}{2}$ p. each.]

Qual. Plant. Maveg., 1958, **3/4**: 374-80, bibl. (in Russian) 16.

Vitamin C values are given for *Actinidia kolomikta*, apples, black currants, cabbage, capsicum, rose hips and tomatoes. Apples and rose hips were distinctly poorer in vitamin C the further south they were grown in Russia. Ripe capsicums were richer in this vitamin in early autumn than in summer. Carotene and lycopene contents are compared for tomatoes ripened at different temperatures and with exposure to ultra-violet light for different daily periods. By selective breeding, a pumpkin variety containing 20.5–30.8 mg. % of vitamin C has been developed. There was evidence of the presence of vitamin P with vitamin C in concentrates from rose hips, black currants, grapes and unripe walnuts. Growth was stimulated in beans, tobacco, tomatoes and mulberry by spraying with 0.001% nicotinic acid or thiamine. The same treatment of young carrots increased leaf growth and raised root yields by more than 50%.—A.N. Bach Biochem. Inst., Acad. Sci., Moscow.

10. GEBAUER, H.

Vitamin E und B in Pflanzen. (Vitamins E and B in plants.) [French summary 9, English 7, lines.]

Qual. Plant. Maveg., 1958, **3/4**: 381-92.

Quantitative data presented for the vitamin E content of the fruits of 8 varieties of capsicum show that this rises with ripening and is correlated with oil content. Contents of individual vitamins of the B complex are given for the fruit juices and pulps of apple, blackcurrant, cherry, elder, gooseberry, mountain ash, raspberry, redcurrant, rose hip, strawberry and tomato, also for pickling cabbage.—Anst. Vitaminforsch., Potsdam-Rehbrücke.

11. RAUDNITZ, H.

Concerning a pigment commonly attributed to the presence of leuco-anthocyanin.

Science, 1958, **128**: 782, bibl. 4.

The red pigmentation in extracts of plants (e.g. rhododendron) has for many years been attributed to anthocyanidins formed through acidification of leuco-anthocyanins. Evidence is now presented which suggests that a similar colour reaction follows acid treatment of humic acid, a compound which is almost ubiquitous in the plant kingdom.—Dep. For., Univ. Oxford.

12. GRIMALDO, R., AND OTHERS.

Contenido en cistina y tirosina de algunos alimentos mexicanos. (Content of cystine and tyrosine in some Mexican foods.) [English summary 5 lines.]

An. Inst. Biol. Univ. Méx., 1957, **28**: 1-10, bibl. 22.

Plant foods rich in protein included *patate* (*Theobroma bicolor*), water cress and black beans (*Phaseolus vulgaris*), ranging in descending order from 5.4% to 3.95%. Nitrogen, protein, cystine and tyrosin contents are tabulated for these and for spinach-beet, *Sesamum* seeds, *Amaranthus paniculatus*, kernels of cashew and *Prunus capuli*, peas, runner beans, pumpkin seeds, *Capsicum* spp., spinach, seeds of *Leucaena esculenta*, mallow sp., prickly pear (*Opuntia* sp.), *Enterolobium cyclocarpum*, pine seeds and *Dondia* sp.

13. CLARK, J. M., JR.

Amino acid activation in plant tissues.

J. biol. Chem., 1958, **233**: 421-4, bibl. 22.

Investigations involving homogenates prepared from spinach leaves and pea epicotyls indicate that these tissues contain amino acid-activating enzymes, and that they possess the ability, largely associated with the soluble fraction of their cells, to activate a wide variety of individual L-amino acids. These results strengthen the view that amino acid activation is involved in protein synthesis.—Calif. Inst. Tech., Pasadena.

14. MARTIN, J. T., BATT, R. F., AND ROBERTS, M. F.

Studies on the natural protective covering of plants: II. The wax and cutin of leaves and fruits.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 84-8, bibl. 9.

Data are presented on: (1) the components of the cuticle-wax of leaves of apples, pears, cabbages, tomatoes and laurels; (2) the cuticle-cutin of leaves of rhododendrons and laurels; and (3) the components of the cuticle of young tomato and black currant leaves and of mature apple fruits. [For part I, see *H.A.*, 28: 257.]

Physiological aspects.

(See also 70i, p, 71b, 144, 975, 978.)

15. KIHLMAN, B. A.

Respiration and radiosensitivity of broad bean roots.

Nature, 1958, **182**: 730-1, bibl. 8.

At low oxygen concentrations the normally low frequency of chromosome aberrations resulting from X-ray treatment of broad bean root tips was strikingly increased by cupferron (the ammonium salt of nitrosophenylhydroxylamine) at 400 μ moles per l. Results are shown graphically.—Inst. physiol. Bot., Univ. Uppsala.

16. ROWAN, K. S., PRATT, H. K., AND ROBERTSON, R. N.

The relationship of high-energy phosphate content, protein synthesis and the climacteric rise in the respiration of ripening avocado and tomato fruits.

Aust. J. biol. Sci., 1958, **11**: 329-35, bibl. 13.

The relationships between respiration rates and the content of protein nitrogen and high-energy phosphate were investigated in ripening avocado and tomato fruits. The climacteric rise in respiration rate was accompanied by a rise in total high-energy phosphate in avocados ripened after picking; in tomatoes ripening on the plant the change in total high-energy phosphate was not significant. The ratio of protein nitrogen to total nitrogen increased during the climacteric rise in both fruits. It is concluded that, while the rates of respiration and synthetic processes may be controlled by the phosphate transfer system, the evidence suggests that uncoupling of respiration and phosphorylation does not explain the respiratory climacteric. [Authors' summary.]—C.S.I.R.O. and Univ. Calif., U.S.A.

17. HYLMO, B.

Passive components in the ion absorption of the plant. II. The zonal water flow, ion passage, and pore size in roots of *Vicia faba*. *Physiol. Plant.*, 1958, **11**: 382-400, bibl. 40.

Hagen-Poiseuille's law is valid for the water passage through the root. Deviations from the law occur at low pressure differences. Then less water flows through the root than is to be expected with the direct proportionality between pressure and water flow. In the root tip, however, no deviation was observed. Two types of pore are distinguished. A wider pore group lets through water even at low pressure differences. These pores grow narrower or fewer with increasing age of the root zone. In another, small sized, pore group the water flows first at higher pressure. The deviation from Hagen-Poiseuille's law makes it possible to determine the average radius of the narrow pores to ca. 1-12 $m\mu$. These pores are assumed to represent the capillaries between the microfibrils in the cell wall. Two components in the chloride absorption through root zones are distinguished. The active accumulation to the root itself is greatest in the root tip and decreases basally. The transpiration component in the chloride transport is shown to be passive and directly linked to the water flow and only indirectly to the pressure difference and the "conductivity". The ions of the true transpiration stream are passaged through the root without being involved in the metabolism of the root. [From author's summary. For part I see *H.A.*, 25: 3479.]—Inst. Plant Physiol., Lund.

18. SUN, C. N.

The survival of excised pea seedlings after drying and freezing in liquid nitrogen.

Bot. Gaz., 1958, **119**: 234-6, bibl. 6, illus.

Excised seedlings (cotyledons removed) of *Pisum sativum* (Little Marvel variety) were used. After drying only, the smaller seedlings, 7-12 mm. long, recovered completely after water losses amounting to 77.1% of the fresh weight (final moisture content of 27%). The intermediate seedlings, 13-20 mm. long, recovered completely after water losses amounting to 74.4% of the fresh weight (final moisture content of 48.8%). Injurious effects were observed when the moisture content was reduced to lower than the above-mentioned percentages. The large seedlings, 21-30 mm. long, were more sensitive to drying, especially in the root portions. The root meristem with normal water content was not injured by immersion in liquid nitrogen for 1 minute, but all other portions of the seedlings were injured and killed. In most cases the small seedlings completely survived exposure to liquid nitrogen, provided that they previously had lost 72-77.1% of their weight by drying (final moisture content 27-40.1%). When the moisture content was less than 14.2%, the root portion failed to survive. In intermediate and large seedlings with low water contents after desiccation, only the stem tips survived after exposure to liquid nitrogen. [Author's summary.]—St. Louis Univ., Missouri.

19. MACDONALD, I. R., and DEKOCK, P. C.
The stimulation of leaf respiration by respiratory inhibitors.
Physiol. Plant., 1958, **11**: 464-77, bibl. 32.

The leaves tested included mustard (*Sinapis alba*), tomato, tobacco, belladonna, avocado, runner bean, spinach-beet and bougainvillea. The inhibitors were potassium cyanide, dinitrophenol, O-phenanthroline, sodium azide, and a mixture of 80-85% carbon monoxide and 20-15% oxygen. In mustard plants bearing 7-8 leaves respiration of the 3 youngest leaves was inhibited by all treatments, that of the 5th and older leaves was stimulated, and the 4th leaf gave a border-line response. Similar results were obtained with belladonna plants. Young leaves of bean and tomato were much more severely inhibited than old leaves, there being one instance of stimulation of old tomato leaves by CO. In tobacco plants cyanide sensitivity of the leaves decreased at any given time from the plant apex downward and in individual leaves as they expanded and matured. Albino Fe-deficient leaves of bougainvillea were more sensitive than the green leaves to cyanide and carbon monoxide. Respiration of mustard leaves, normally checked by CO, was stimulated by it where Mn was deficient and Fe consequently at toxic level. The effect of cyanide on avocado leaves changed from inhibition to stimulation with increasing age, which was accompanied by Fe accumulation. In spinach-beet the inhibiting effect was greatest in Fe-deficient and least in Mn-deficient (Fe-toxic) leaves.—Macaulay Inst., Craigiebukler, Aberdeen.

Moisture relations.

20. FINN-KELCEY, P., AND HULBERT, D. G.
The relationship between relative humidity and the moisture content of agricultural products—preliminary report.
Tech. Rep. Brit. electric. Res. Ass. W/T33, 1957, pp. 31, bibl. 49, illus., plus 38 graphs, 24s.

This report presents, in a practical and convenient form, the results of an investigation into the equilibrium moisture content of a number of agricultural and horticultural materials [including cacao beans and various vegetable seeds] in atmospheres of different relative humidities. The apparatus and technique used in the investigation are described in detail, with particular reference to the maintenance of constant relative humidity, and the investigations of many previous workers are reviewed. The authors' conclusions are set out and some recommendations are made for the practical application of the results to drying processes. [Authors' summary.]

21. WINNEBERGER, J. H.
Transpiration as a requirement for growth of land plants.
Physiol. Plant., 1958, **11**: 56-61, bibl. 4.

Under experimental conditions of extreme high relative humidity, the growth of Hardy pear buds was completely checked and the growth rates of germinating sunflower seedlings and of young sunflower plants were reduced to about half their normal value. This reduction of growth was not accompanied by leaf chlorosis or mineral deficiency symptoms. It was concluded that transpiration is a necessary function of some higher land plants and must occur for growth. It was suggested that transpiration is the energy source for both organic and inorganic solute translocation. [Author's summary.]—Univ. Calif., Berkeley.

22. STREBEYKO, P.
Wahania zawartości wody w liściach roślin uprawnych jako wskaźnik i miara wahań bilansu wodnego. (Variations in the water content of leaves of cultivated plants as an indication and measure of water balance fluctuations.) [English and Russian summaries 5 pp. each.]
Roczn. Nauk rol., Ser. D, 1957, **79**: 5-117, bibl. 22.

Investigations were carried out during 1954-1956 at 8 locations covering most of the Polish climatic zones. Moisture determinations were made on samples of leaves picked in the morning, midday and afternoon from 38 cultivated species including *Vicia faba*, *Solanum lycopersicum*, *Cannabis sativa*, *Helianthus tuberosus* and *Ricinus communis*. Variations in the water content were not so great as was expected. The greatest water deficiencies occurred in blades of grasses on hot days (11-21%) and these also had the lowest average content. Water content declined with age, gradually in most cereals and sharply at the very end of the growing period in other crops. Other factors affecting water content were physiological age of the plant, age and position of the leaf on the stem, population density and N fertilization. This work is regarded as preliminary to the problem of effective water management for cultivated crops.

23. McCUNE, D. L.
Effect of moisture tension on the production and movement of carbohydrates in plants.
Diss. Abstr., 1958, **18**: 1932, being *L.C. Card No Mic. 58-1801* of 130 pp.

Carbohydrate movement was determined by tracing the movement of P³² which, when applied to the leaf, was found to move only in the presence of carbohydrate. Carbohydrate movement from leaves of sunflowers and soya beans, and from cotyledons of soya beans was increased as moisture tension increased, where there were definite signs of wilting. Carbohydrate production was measured

by carbon dioxide uptake. Both soya bean and tomato plants showed a stepwise decrease in C^{14} uptake as moisture stress was increased, with only slight evidence of photosynthesis in wilted plants. Growth as measured by elongation in these experiments decreased as moisture stress increased. Under moisture stress phloem movement was increased while xylem movement was decreased. These results indicate that an increase in moisture stress speeds up carbohydrate movement from mature leaves and cotyledons, and decreases carbohydrate production and plant elongation.—Purdue Univ.

Light effects.

(See also 395, 492, 497-499, 506, 514, 565, 566, 690, 710, 764, 766, 907.)

24. SPEAR, I.

The effect of modifying the dark period atmosphere on the flowering of short-day plants.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xix.

Inhibition of aerobic respiration led to inhibition of flowering in *Kalanchoë blossfeldiana* and *Xanthium pennsylvanicum* under long night conditions and did not reverse the inhibition exerted by light interruptions. Changes in CO_2 concentration had little effect on flowering response.—Univ. Texas, Austin.

25. CAMPBELL, C. W.

Modification of light control in plant development.

Diss. Abstr., 1958, 19: 202-3, being *Publ.* 24,152 of 113 pp.

Flowering in cocklebur in long-day conditions was induced by increasing the atmospheric content of CO_2 (10% or higher) during the first part of the light period. Increased CO_2 during the photo-inductive dark period inhibited flowering. Gibberellic acid was found to release completely lettuce seeds from light control. An inhibition of germination rate as a result of short-term white light irradiation was observed in GA-treated seeds. GA stimulated lettuce germination at all concentrations tested, while IAA had a strong inhibitory effect. This inhibition was to some extent overcome by GA.—Purdue Univ.

26. SIRONVAL, C.

Day-length and haematin compounds in plants.

Nature, 1958, 182: 1170-1, bibl. 8.

In mature leaves and roots of lupin and soya bean there was generally a constant molar ratio of about 60 molecules of chlorophyll to 1 molecule of haematin. Short-day treatment reduced haematin and chlorophyll contents simultaneously and to the

same extent, while long-day treatment increased both. These facts indicate that lack of nodule formation and efficiency in short days is due to haematin deficiency, which in turn is related to a depression of chlorophyll content. In wild strawberry, which does not flower in short days, there were much lower contents of chlorophyll and haematin in mature leaves in short than in long days. In hemp (*Cannabis sativa*), however, which flowers in short days, haematin content rapidly increases in short days, whereas chlorophyll content decreases. This effect is reversible, and on transfer back to long days the molar ratio of chlorophyll to haematin returns to its normal value of 60 and induction of flowering stops.—Dep. Biochem., Cambridge, and Centre Hormones vég., Liège.

27. BJÖRN, L. O., AND VIRGIN, H. I.

The influence of red light on the growth of pea seedlings. An attempt to localize the perception.

Physiol. Plant., 1958, 11: 363-73, bibl. 16.

Dark-grown pea seedlings have been irradiated for short periods (10 min. a day) beginning with the fourth day after planting. The light used had its maximum energy around 660 m μ . The effect of the irradiation on unscreened plants consists of a decrease in the lengths of the epicotyl (first internode), previously reported on many occasions, an increase in the length of the internodes higher up, and also of an increase in the development of the leaves. By screening different parts of the seedling during irradiation, the effect of the red light varies, depending on which parts are exposed to light. There seem to be no distinctly definable areas of radiation perception. The nodes, however, are more light-sensitive than the internodes. The distribution of the areas giving the strongest response to red irradiation seems to agree with the sites for the formation of the green and yellow pigments of the plant. [Authors' summary].—*Inst. Plant Physiol.*, Lund.

28. LOCKHART, J. A.

The response of various species of higher plants to light and gibberellic acid.

Physiol. Plant., 1958, 11: 478-86, bibl. 14.

The effects of darkness, dim red light and bright red light on stem elongation are compared for squash, cucumber, pea and tall and dwarf bean varieties. Gibberellic acid (GA) treatment of squash and cucumber partially counteracted the inhibiting effect of light, but complete reversal was confirmed in peas for low and moderate intensity red and blue light. Beans responded even more markedly, being sensitive to 0.04 μ g. per plant, whereas cucumbers gave little response to 4 μ g. per plant. In all 4 crop plants, growth was inhibited more strongly by red than by blue light. Relatively high concentrations of IAA (4-400 m μ g. per plant), with or without GA, markedly

inhibited cucumber stem growth in darkness, but resulted in little or no further growth reduction in plants grown in the light. Neither GA nor IAA reversed the inhibiting effect of ultraviolet radiation on beans or squash.—Calif. Inst. Technol., Pasadena.

29. LOCKHART, J. A.

The influence of red and far-red radiation on the response of *Phaseolus vulgaris* to gibberellic acid.

Physiol. Plant., 1958, **11**: 487-92, bibl. 4, illus.

Both dwarf and normal varieties of *Phaseolus vulgaris* fail to respond to gibberellic acid when grown in complete darkness. Brief exposure to red light causes both types of plants to elongate markedly in response to gibberellic acid applications. The effect of red light is reversed by subsequent exposure of the plant to far-red radiation. Stem elongation in response to gibberellic acid treatment in light is substantially greater than growth in darkness, indicating that the growth of these plants is *promoted* by light when gibberellin is made non-limiting. [Author's summary.]—Calif. Inst. Technol., Pasadena.

Winter injury.

30. HOLMES, R. M., AND ROBERTSON, G. W.

Note on a portable field growth chamber for winter injury studies.

Canad. J. Plant Sci., 1958: **38**: 377-9, illus.

As an aid to assessing more accurately the time and cause of winter injury, a device was constructed that would enable wintering crops to start growing actively at any time during the winter. It consisted of a bottomless, insulated aluminium chamber equipped with electrical heaters and fluorescent lights. Although during the first winter the chamber was used on alfalfa as a test crop, it could be adapted for studies on many kinds of wintering plants, including shrubs and small trees.—Exp. Fms Serv., Canada Dep. Agric.

Phytoalexins.

31. MÜLLER, K. O.

Studies on phytoalexins. I. The formation and the immunological significance of phytoalexin produced by *Phaseolus vulgaris* in response to infections with *Sclerotinia fruticola* and *Phytophthora infestans*.

Aust. J. biol. Sci., 1958, **11**: 275-300, bibl. 34, illus.

In using the inner epidermis of *Phaseolus vulgaris* pods as host tissue and *Sclerotinia fruticola* and *Phytophthora infestans* as pathogens which interact in a hypersensitive fashion, a principle (or principles?) was separated from the former which

exerts a strongly inhibitory effect on the growth of the latter. It is shown that this principle (phytoalexin): (i) Is the result of an interaction between host and pathogen and is absent from non-infected host tissue at concentrations which could exert an inhibitory effect on the pathogen. (ii) Is formed at a rate and at concentrations which are sufficient to prevent further growth of the pathogen in the diseased tissue. (iii) Is not specific, and (iv) Possesses properties from which its nature as an individual chemical factor(s) becomes obvious. Concerning the action of the phytoalexin(s) under consideration, results as follows were obtained: (i) The antibiotic activity is not influenced by chemical factors in the host tissue which may serve as nutrients to the pathogen. (ii) Within a pH range of 4.0-7.5, the hydrogen ion concentration exerts neither an antagonistic nor a synergistic effect on the activity of the inhibitory principle. (iii) There is strong adsorption of the active principle to non-parasitized cells. (iv) The output per unit volume of parasitized tissue is dependent on the age of the host tissue. Six other host-pathogen combinations, which interact in a hypersensitive fashion, were shown to produce, post-infectionally, inhibitory principles at concentrations sufficient to stop the pathogen's growth. In the light of these results, the mechanism is discussed which underlies the local lesion reaction. It is stressed that—at least in the cases under discussion—"resistance" is preconditioned by the ability of the host tissue to encounter the metabolic activities of the pathogen with the formation and the accumulation round the infection sites of an antibiotic principle which has been termed "phytoalexin". [Author's summary.]—C.S.I.R.O., Canberra.

32. JEROME, S. M. R., AND MÜLLER, K. O.

Studies on phytoalexins. II. Influence of temperature on resistance of *Phaseolus vulgaris* towards *Sclerotinia fruticola* with reference to phytoalexin output.

Aust. J. biol. Sci., 1958, **11**: 301-14, bibl. 20, illus.

The resistance of pods of *Phaseolus vulgaris* towards the parasites *Sclerotinia fruticola* and *Botrytis cinerea* is shown to be affected by the temperature environment before inoculation. At the critical temperature of 44° C. for 2 hr., the loss of resistance is seen to be a reversible process. Recovery takes place within 3 days, when stored at a temperature of 20° C. The storage temperature after heat-conditioning is important for the recovery process. The output of the post-infectionally produced defensive substance—phytoalexin—is likewise affected by pre-inoculation conditioning at various temperatures. Under all conditions there is a close correlation between the clinical behaviour of the pods and phytoalexin production. Respiration rate as shown by oxygen uptake

in air is affected by the preconditioning treatment with high non-lethal temperatures. There appears to be no direct correlation between the oxygen uptake and the clinical behaviour or phytoalexin output, though there is an obvious connection. Practical applications of these results are considered: the effect of climate on the state of resistance of hosts to particular parasites; the optimal conditions for storage of fruit and vegetables. [Authors' summary].—C.S.I.R.O., Canberra.

Phytoncides.

33. CSONGRÁDY, M., AND UBRIZSY, G.
Fitoncidok alkalmazása növényi kórokozók ellen. I. rész. (The use of phytoncides against phytopathogens. Part I.)
Ann. Inst. Prot. Plant. Hung. 1952-1956, 1957, 7: 367-9, from *Hung. agric. Rev.*, 1958, 7, Abstr. 154.

Of 160 flowering plants examined in the laboratory 35 showed some phytoncidal activity. Cucumber seed treated with onion phytoncides produced seedlings showing 12% *Rhizoctonia* infection compared with 88% in seedlings from untreated seed. Emanations from the seed pulp of *Sinapis alba* retarded the germination of bean seed by 80% and completely prevented it in broad bean seed.

Air pollution.

(See also 783.)

34. THOMAS, M. D., AND OTHERS.
Air pollution with relation to agronomic crops.
Agron. J., 1958, 50: 545-68, bibl, illus.

A symposium is presented, consisting of 7 papers. 1. (Thomas, M. D.)—General status of research on the effects of air pollution on plants. 2. (Noble, W. M. and Wright, L. A.)—A bio-assay approach to the study of air pollution. (Petunia is one of the plants used to determine the nature of pollution.) 3. (Cole, G. A.)—Vegetation survey methods in air pollution studies. (Indicator species include blackberry, *Ambrosia trifida*, *Helianthus* sp., *Geranium carolinianum*, and *Quercus marilandica*.) 4. (Taylor, O. C.)—Plant growth suppressed by exposure to air-borne oxidants—smog. (Bean, petunia, tomato and citrus.) 5. (Richards, B. L., Middleton, J. T., and Hewitt, W. B.)—Oxidant stipple of grape. (Mainly due to ozone.) 6. (Hill, A. C., and others)—An investigation of the "hidden injury" theory of fluoride damage to plants. (The effects of hydrogen fluoride on chlorophyll content, photosynthesis and respiration of tomato leaves.) 7. (Hansen, E. D., Wiebe, H. H., and Thorne, W.)—Fluoride uptake from soils. (Turnip absorbed less added F where the soils were rich in clay, lime and organic matter. Under field conditions, absorption of F directly from the air was apparently much greater than indirect uptake via the soil.)

35. ANON.

Smog protector for plants.

J. agric. Food Chem., 1958, 6: 697.

Ozoban, developed at the University of California, Riverside, is a readily soluble anti-oxidant blended into an ascorbic acid formulation. A light spray applied before and during smog prevents burning and bronzing of leaves.

36. FREEBAIRN, H. T.

The prevention of "smog" injury to plants by the use of sprays and metal filters.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlii.

A number of plants were protected from smog by foliar applications of potassium ascorbate, the leaf contents of ascorbate showing significant increases. The amount of ascorbic acid in a leaf is related to the degree of damage resulting from fumigation with oxidising agents. Complete smog protection to petunias was given by using metal filters.—Univ. Calif, Riverside.

Nutrition.

(See also 70j, y, 71m.)

37. TUKEY, H. B., JR., TUKEY, H. B., AND WITTWER, S. H.

Loss of nutrients by foliar leaching as determined by radioisotopes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 496-506, bibl. 19, illus.

TUKEY, H. B., WITTWER, S. H., AND TUKEY, H. B., JR.

Leaching of nutrients from plant foliage as determined by radio-isotopes.

Reprinted from *Proc. int. Conf. Radio-isotopes in sci. Res.*, UNESCO, [1958?], pp. 14, bibl. 24, illus.

Losses of radioactive nutrients by leaching from the above-ground parts of plants were small, but increased with leaf maturity and became largest as leaves approached senescence. Losses of Ca^{45} , K^{42} and P^{32} from squash and bean leaves were much greater than from tomato leaves. More Ca^{45} and K^{42} was leached from attached than from detached squash leaves. In squash plants P^{32} losses from P-deficient plants were much greater than from plants grown at a normal P level, and losses of Ca^{45} from Ca-deficient bean plants were twice as great as from beans grown with adequate Ca. The relative ease of leaching of 11 isotopes from bean and squash plants is given. Nutrients leached from leaves of one plant were reabsorbed by the roots of the same and of different species. In young apple trees protected from rain, leaf contents of Ca, Mn and N were higher than in trees growing in the open, but levels of Fe, K, Mg, P and Zn were similar in both sets of trees, indicating that these elements are not readily leached from young leaves. Carbohydrate losses

from strawberry fruits varied directly with maturity. Losses of Sr^{90} amounted to 75% of the isotope in the fruit regardless of the stage of maturity. It is considered that more attention should be paid to the ability of leaves and fruits to absorb as well as lose constituents.—Mich. St. Univ., E. Lansing.

38. THORNE, G. N.

Factors affecting uptake of radioactive phosphorus by leaves and its translocation to other parts of the plant.

Ann. Bot., 1958, **22**: 381-98, bibl. 25.

The rate of uptake of ^{32}P from labelled NaH_2PO_4 solutions sprayed on to one leaf of swedes (*Brassica napus*) or French beans (*Phaseolus vulgaris*) was rapid during the first few hours and fell to zero after 4 days. ^{32}P was detected in the root after 3 hours and continued to move out of the treated leaf for at least 6 days after application. A larger fraction of the applied ^{32}P was absorbed from repeated than from a single spraying. Swedes absorbed more ^{32}P from a single application to the lower surface than to the upper surface of the leaf. Doubling the concentration of the spray caused a small increase in the percentage of applied ^{32}P that was absorbed. Absorption by French-bean leaves decreased slightly when the area sprayed with a constant amount of ^{32}P was doubled, and decreased with increasing age of leaf. Increasing the phosphorus supply to the roots of swedes affected neither the initial rate nor the total amount of ^{32}P uptake by the leaves but decreased the quantity of ^{32}P that was translocated out of the treated leaf. Increasing the relative humidity of the air around the plants also increased ^{32}P uptake. Shading usually decreased uptake and always decreased translocation. Rewetting the leaf to which the ^{32}P had been applied, with water or sucrose solution, had variable effects. The significance of the results is discussed. [Author's abstract.]—Rothamsted exp. Stat., Harpenden, Herts.

39. BERTRAND, D.

Oligo-éléments des végétaux cultivés. (Minor elements in cultivated plants.) [English and German summaries $\frac{1}{2}$ p. each.] *Qual. Plant. Maveg.*, 1958, **3/4**: 569-605, bibl. 157.

A review, covering the occurrence and rôle of minor elements, supporting the hypothesis that they act as co-enzymes, and discussing the law of optimal concentration of nutrients.—Inst. Pasteur, Paris.

40. CHAMBIONNAT, A.

Utilisation des séquestrants en agriculture. Le problème des oligo-éléments. (Use of chelating agents in agriculture. The problem of minor elements.) *Terre maroc.*, 1958, **32**: 285-8, bibl. 9.

Availability of Fe in applied ferrous sulphate was low in acid soil, but chelation with either EDTA (ED 4 A) or HEEDTA (ED(OH) 3 A) raised it to 100%. In alkaline soil, where the Fe salt was completely insoluble, EDTA rendered it 25-30% available and HEEDTA 50-55%. Availability in aqueous foliar sprays was increased from a low value to 60% by EDTA and 100% by HEEDTA. Application of Fe in conjunction with copper fungicides was unsatisfactory, even with chelation. Results for Mn, Zn and Cu were very similar, but obviously nutrient Cu was not reduced in availability by the presence of the fungicide. Although HEEDTA gave the best results, EDTA was more economic. To avoid insoluble deposits on treated leaves, the author recommends chelation of the Ca and Mg in the water by the buffering method described elsewhere for 2,4-D treatment [see *H.A.*, **25**: 3890].

Growth substances.

(See also 6, 25, 28, 29, 70h, s, v, w, 71h, k, p, 100, 101, 113, 118, 131, 133-137, 169b, 182, 234, Weed and weed control section, 453, 454, 494-496, 503, 518, 519, 556, 568, 593-597, 686, 699-702, 744, 763, 789, 796, 805, 890, 908, 948.)

41. LIBBERT, E.

Der primäre Angriffsort pflanzeneigener Hemmstoffe. (The primary seat of action of growth inhibitors occurring in plants.)

[English summary $\frac{1}{2}$ p.]

Physiol. Plant., 1958, **11**: 516-23, bibl. 13.

Extracts of pea plants containing a growth inhibitor prevented enzymatic conversion of tryptophane into IAA *in vitro*. The inhibitor extract had only a slight effect on stem elongation of peas and attempts to determine the presence of an anti-auxin were inconclusive.—Humboldt-Univ., Berlin.

42. MARRÈ, E., AND FORTI, G.

Metabolic responses to auxin. III. The effects of auxin on ATP level as related to the auxin induced respiration increase.

Physiol. Plant., 1958, **11**: 36-47, bibl. 13.

From experiments on excised pea internode segments it is concluded that the primary effect of auxin on oxidative metabolism does not depend on phosphate acceptor availability, but more probably involves the activation of oxidative enzymes. Only in a second phase of the auxin action should a considerable part of the respiratory rise be explained as a consequence of an increased utilization of high energy phosphate in metabolic processes involved in growth.—Univ. Milan.

43. WICKSON, M., AND THIMANN, K. V.

The antagonism of auxin and kinetin in apical dominance.

Physiol. Plant., 1958, **11**: 62-74, bibl. 12.

The elongation of the second lateral bud of

isolated pea stem sections, in sucrose solution and light, has been used to study the factors controlling the growth of lateral buds. Several auxins at physiological concentrations inhibit the growth more or less completely. This inhibition occurs only if the auxin is applied immediately after decapitation. When IAA at concentrations below 8 mg. per liter is used as the auxin, bud development may begin spontaneously after about five days. If kinetin at concentrations between 1 and 10 p.p.m. is applied together with the auxin, the inhibition can be completely removed. In general the higher the auxin concentration the higher the kinetin concentration needed to remove the inhibition. Kinetin causes bud development in the same way when the inhibiting auxin is being provided by the intact apex. It is suggested, therefore, that the normal phenomenon of apical dominance depends on an interaction between auxin and a kinetin-like substance in the plant. Gibberellic acid also promotes bud elongation in this system, but reasons are given for believing that its action is exerted only after the inhibition has been released. [Authors' summary.]—Harvard Univ., Mass.

44. GORTER, C. J.

Synergism of indole and indole-3-acetic acid in the root production of *Phaseolus* cuttings.
Physiol. Plant., 1958, **11**: 1-9, bibl. 9.

The synergism of indole and IAA was investigated by recording the production of adventitious roots on hypocotyls of *Phaseolus vulgaris*. IAA in concentrations 10^{-7} to 10^{-4} M increases root production (the relation: number of roots—log. IAA conc. is a straight line). Indole (10^{-3} M and 10^{-6} M) enhances the effect of IAA in all concentrations. The curve: number of roots—log. IAA concentration becomes convex to the x-axis. This "indole effect" can be explained by the assumption that indole decreases the IAA oxydase activity and that this oxydase is an adaptive enzyme. Boron increases root production, in combination both with IAA and with IAA+indole. In all cases B brings the root production to a higher level, never altering the shape of the curves. It was suggested that: (a) Indole decreases the IAA oxydase activity. (b) Boron influences the growth in length of the roots. [From author's summary.]—Lab. TuinbPl., Wageningen.

45. STOWE, B. B.

Growth promotion in pea epicotyl sections by fatty acid esters.
Science, 1958, **128**: 421-3, bibl. 9.

Excised pea epicotyl sections, such as are used in the standard auxin bioassay, make less growth than comparable sections left on intact plants, even when they are supplied with optimum concentrations of IAA, GA, sucrose and cobalt. In the study described here the addition of fatty acid esters pro-

moted growth to a greater extent than has previously been reported for other substances. The fatty acid esters, which produced this response in epicotyls of both a tall and a dwarf pea variety, were ethanol extracts of peas (which consist largely of glycerides), the detergents Tween 20 and Tween 80, and methyl linoleate and methyl oleate. When fatty acid esters were supplied without IAA, however, their effects were negligible or inhibitory, and when supplied with GA alone their effects, though positive, were also very small. The maximum effect was produced when they were supplied in the presence of both IAA and GA. As the esters proved to be effective in quantities that were at most 20 to 35 times as large as those of IAA, it would seem that their role is hormonal rather than purely nutritive. These results suggest that the conditions for the pea-section auxin bioassay need reassessment. They do not throw light on the problem of why GA, which has so large an effect on intact peas, has only a small effect on excised sections.—Harvard Univ., Cambridge, Mass.

46. PRESTON, W. H., JR., AND LINK, C. B.

Use of 2,4-dichlorobenzyltributylphosphonium chloride to dwarf plants.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xlix.

Typical dwarfing responses were induced by 2,4-dichlorobenzyltributylphosphonium chloride applied as a paste to localized areas on stems, as an over-all spray or mixed with soil. Plants which developed shorter internodes after treatment include balsam, marigold, *Phaseolus* spp., sweet pea, Georgia lily, poinsettia, Chinese elm, philodendron, morning glory and cucumber.—U.S.D.A., Glenn Dale, Md, and Univ. Maryland, College Park.

47. SHANTZ, E. M., MEARS, K., AND STEWARD, F. C.

Comparison between the growth-promoting effects on carrot-tissue of coconut milk and of kinetin and certain of its analogues.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xvi.

Kinetin was only moderately stimulatory to cell division in cultures of carrot stem tissue, as compared with whole coconut milk. In comparative tests with carrot tissue, several related 6-substituted purines were more active than kinetin, but all were effective only in the presence of IAA. The effect on growth was further increased in some cases by the addition of casein hydrolysate.—Cornell Univ., Ithaca, N.Y.

48. GRAY, R. A.

Preparation, chemical and biological properties of pure 3-indoleacetaldehyde.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): v.

3-indoleacetaldehyde was isolated as the pure

crystalline sodium bisulphite addition compound. This product was effective in initiating root growth with Chinese *Hibiscus* stem cuttings and African violet leaf cuttings, and in setting fruit on greenhouse tomatoes.—Merck and Co., Inc., Rahway, N.J.

49. SMALE, B. C., AND DALY, E. J.

Identification of translocated regulating chemicals through plant response and chromatography.

J. agric. Food Chem., 1958, **6**: 751-2, bibl. 8, illus.

The method described is of value in translocation studies of growth substances that are not readily available in forms labelled with radioactive isotopes. It involves (1) a comparison between the R_f values obtained when a translocated substance and the original growth substance applied are chromatographed, and (2) the morphological responses given by a test plant to the translocated substance following its elution from the paper chromatogram. The chromatographic results obtained with IAA, 2,4-D, GA, MOPA and 2,3,5-TIBA are tabulated, and the responses shown by the test plant, young Pinto beans, are described and illustrated.—U.S. Dep. Agric., Beltsville, Md.

50. RIDDEL, J. A.

Reversal of growth inhibition induced by maleic hydrazide with gibberellic acid.

Unpubl. Rep. Naugatuck Chem. Div., 1956.

Tomato plants 6-week-old, were treated with MH sprays at 500 and 2,000 p.p.m. Gibberellic acid (100 p.p.m.) in lanolin paste was applied to the upper (5th) node 0, 1, 2, 7, 14 and 21 days after the MH treatment. No recovery of the plants treated with 2,000 p.p.m. MH was observed, but GA promoted growth and increased the node number of the terminal branch following the 500 p.p.m. MH dosage. The reversal of the growth inhibition was most evident when the GA was applied 1 week after the MH spray. A shorter or longer interval between the two treatments resulted in little or no change from the MH-treated checks. The new growth resulting from the GA treatment was not normal. The internodes were short and the leaves small and chlorotic.—*Weed Abstr.*, **7**, No. 2038.

51. RADLEY, M.

The distribution of substances similar to gibberellic acid in higher plants.

Ann. Bot., 1958, **22**: 297-307, bibl. 19.

Gibberellic-acid-like substances have been found in extracts from all parts of seedlings of tall and dwarf peas and in mature seeds of wheat, French bean and tall and dwarf peas. They were present in amounts equivalent to 0.1–0.3 μ g. gibberellic acid in 100 plants (F.W. 100–200 g.). Immature runner bean seed yielded larger quantities, equivalent to 0.25 μ g. gibberellic acid per gram fresh

weight, distributed between testas, cotyledons, and embryos. [Author's abstract.]—I.C.I. Ltd., Akers Res. Lab., Welwyn, Herts.

52. ASHTON, F. M.

The interaction of gibberellic acid and 2,4-D.
Proc. 16th west. Weed Control Conf., 1958, pp. 31-3.

Young french bean plants were sprayed to run-off with a 100 p.p.m. solution of gibberellic acid (GA) and 48 hours later radioactive 2,4-D was applied to a primary leaf. The percentage of 2,4-D recovered from non-treated parts of the plants was (for those pre-treated with GA and those not so treated, respectively): after 24 hours 16.9 and 15.9%, after 72 hours 15.1 and 8.8% and after 120 hours 12.8 and 5.1%.—*Weed Abstr.*, **7**, No. 1558.

53. RAPPAPORT, L., AND BONNER, J.

Quantitative plant responses to gibberellin and some climatic factors.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xliii.

Biweekly applications of gibberellin (50 or 100 μ g. per plant) were shown to replace vernalization or long days in their effect on endive flowering. Gibberellin-treated, non-vernalized plants grown in short days (8-hour photoperiods) were twice as tall as untreated vernalized plants grown in long days (16-hour photoperiods), but they flowered at the same time, after producing similar leaf numbers. A single application of gibberellin caused only temporary seedstalk elongation of endive, while vernalization had a more lasting effect. Quantitative replacement of vernalization and long photoperiod was possible in plants grown at optimum temperatures (23° [c.] day, 17° night), as well as in plants grown at night temperatures higher (23°) or lower (10°) than the optimum. Gibberellin was not an effective substitute at less favourable growing temperatures.—Univ. Calif., Davis, and Calif. Inst. Tech., Pasadena.

54. NIELSEN, N., AND BERGQVIST, G.

The stimulation of the respiration of seeds with gibberellic acid and its analytical application.

Physiol. Plant., 1958, **11**: 329-31, bibl. 1.

Seeds of peas and other crops were soaked in solution of gibberellic acid ranging from 1 to 100 p.p.m. in concentration. Detailed results are given only for barley, but respiration of pea seeds was stimulated by treatment. Use of the method for quantitative analysis of gibberellins is discussed.—A/B Kabi, Stockholm.

55. YODA, S., AND ASHIDA, J.

Effect of gibberellin on the extensibility of the pea stem.

Nature, 1958, **182**: 879-80, bibl. 6.

An experiment is described which showed that gibberellin made the stem less yielding to an extending force. Plasticity was also decreased. IAA had opposite effects.—Kyoto Univ., Japan.

56. PURVES, W. K., AND HILLMAN, W. S.
Response of pea stem sections to indoleacetic acid, gibberellic acid, and sucrose as affected by length and distance from apex.

Physiol. Plant., 1958, **11**: 29-35, bibl. 13.

The further the sections are from the apex, the less is the endogenous growth and the response to GA and sucrose, and the greater is the relative response to IAA as compared with GA. Longer sections are less sensitive to sucrose, and they show greater elongation than the corresponding short sections at a given distance from the apex. Longer sections may contain tissues heterogeneous in their response to IAA and GA. Our results underline the necessity of accurately specifying the type of sections employed in pea section growth tests. Small sections taken very close to the apex may prove to be a useful bioassay material for the gibberellins. [Authors' summary.]—Josiah Willard Gibbs Res. Lab., Yale Univ., New Haven, Conn.

57. KATO, J.
Studies on the physiological effect of gibberellin. II. On the interaction of gibberellin with auxins and growth inhibitors.
Physiol. Plant., 1958, **11**: 10-15, bibl. 3.

Experiments were conducted with mixtures of gibberellin and auxin on pea stem sections, bean stems and cucumber seedlings to determine the difference between the action of the 2 growth substances. When IAA and NAA were used at concentrations that promoted shoot growth, GA acted additively, but when they were used at concentrations that inhibited shoot growth GA reversed the inhibition. The inhibition of root growth by IAA and NAA was neither reversed nor intensified by GA. The inhibition of shoot growth by maleic hydrazide and coumarin was reversed by GA, but the inhibition of root growth was not. GA inhibited root formation and counteracted the stimulatory effect of auxin on root formation. It is concluded that GA and auxin act on different points in the growth mechanism of both shoot and root.—Kyoto Univ.

58. CORCORAN, M. R., AND PHINNEY, B. O.
An inhibitor of gibberellin induced growth.
From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xl.

Diffusates from immature seeds of carob (*Ceratonia siliqua*) and loquat (*Eriobotrya japonica*) markedly inhibited gibberellin-induced growth.—Univ. Calif., Los Angeles.

59. BUKOVAC, M. J., AND WITTWER, S. H.
Comparative biological activities of gibberellins A₁, A₂, A₃, and A₄.
From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxxviii-xxxix.

No significant differences were noted in epicotyl elongation of bean following apical application of 10 μ l. of gibberellins (3×10^{-3} M) A₁, A₂, A₃ and A₄. A₂ applied to the leaf blade of one of the primary leaves resulted in less hypocotyl extension than A₁, A₃, or A₄. Increases in dry weight of 27%, 8%, 16% and 39% above controls were obtained in celery plants grown in solution cultures with 11-hour photoperiods following treatment with A₁, A₂, A₃ and A₄ respectively. Gibberellins A₁ and A₂ were significantly more effective in accelerating flowering of lettuce and dill, and produced taller seedstalks than A₃ and A₄. In comparative fruit setting activities, 3×10^{-3} M solutions of A₁, A₂, A₃ and A₄ were equally effective in stimulating growth of tomato ovaries, but less effective than para-chlorophenoxy-acetic acid.—Mich. St. Univ., E. Lansing.

60. CATHEY, H. M.
Growth evaluations of four gibberellins and several derivatives.
From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xliii.

Gibberellin A₂ was the most active in promoting elongation in chrysanthemum, hydrangea, pinto bean and maize. Gibberellin A₂ had no, and gibberellin A₄ had little, effect in promoting elongation of the test plants. Allo-gibberellic acid monohydrate and the methyl ester of gibberellic acid had little effect when applied either to leaves or roots.—U.S.D.A., Beltsville, Md.

61. KRASIL'NIKOV, N. A.
The Soviet gibberellin. [Russian.]
Priroda, 1958, **47**(7): 81-4, bibl. 5, illus.
"Native gibberellin" or "preparation G" was obtained from a *Fusarium* sp. isolated from a diseased grapevine in Central Asia. Its chemical and physical characteristics and biological action are very similar to those of gibberellic acid, but its identity with the latter compound is as yet uncertain. Other growth promoting substances referred to as preparations A₁ and A₂ obtained from cultures of actinomycetes, and preparation D from soil yeasts of the group *Torulopsis*, are also mentioned.

Glasshouses.

(See also 68, 70a, b, d, t, 71i, o, 240, 311g, 559b, 960a.)

62. MICHEL, K.
Die Luftheizung im Gartenbau. (Air heating in glasshouses.)
Schweiz. Gärtnerztg, 1958, **61**(31): 2-4, illus.
A heating system is described in which a fan sucks

the air from the glasshouse and returns it through a special heating apparatus. The resulting heat is purely convective and, incidentally, the air humidity is somewhat reduced.

63. LINNÄSLÄM, A.

Phytotoxicity of wood preservatives and possibilities of using them in greenhouses and benches. [Finnish summary 1½ pp.]

Tuuli Maailmanrak. Julk. 100, 1958, pp. 40, bibl. 13, illus.

Greenhouse tests were carried out at the Agricultural Research Centre, Tikkurila, with 4 water-soluble and 4 oil-soluble wood preservatives. In general water-soluble compounds did not damage plants through the soil or by volatilizing into the air. Drips from wood treated with Boliden (27.3%, arsenic acid, 23.8%, sodium arsenate, 18.1%, sodium dichromate and 30.8%, zinc sulphate) and Wolman (25%, sodium fluoride, 25%, sodium arsenate, 37.5%, sodium dichromate and 12.5%, dinitrophenol) salts were phytotoxic to test plants, but those from wood treated with Celcure (45%, cupric sulphate, 5%, chromic acetate and 50%, sodium dichromate) and Lähoorute K35 (35%, arsenic pentoxide, 27-42%, chromium trioxide and 15-27%, cupric oxide) were not toxic. Among the oil-soluble preparations used, only copper naphthenate was non-phytotoxic. The most susceptible of the test plants to injury were cucumber, cineraria and tomato; ruly also was severely damaged. Cabbage, swede and cyclamen were the least sensitive of the test plants.

64. REINHOLD, J., AND OTHERS.

Die Einrichtung der Luftheizung für Gewächshäuser. [The installation of air heating for glasshouses.]

Dtsch. Gärtnerb., 1958, 5: 175-9, bibl. 7, illus.

The advantages of warm air heating in comparison with that by hot water are discussed. Two methods of heating are described, viz. a central system which heats multi-span houses, and a single heating system which heats only one span.—Inst. Gärtnerb., Grossbeeren, and VE. Gemüsekomb., Wollup.

65. TRICKETT, E. S., AND GOLDEN, J. D. S.

The radiation transmission and heat conserving properties of glass and some plastic films. [French, German and Spanish summaries 4-12 lines each.]

J. agric. Engng Res., 1958, 3: 281-7, bibl., illus.

Ten plastic substances were examined and, on optical considerations, none was superior to glass, although some may have special uses and also lead to structural economy. At present it appears that, where opacity to long-wave radiation is important, a formulation of p.v.c. having good ageing properties would be satisfactory. Polythene is valuable

where opacity to infra-red radiation is unimportant.—Nat. Inst. Agric. Engng and Nat. Inst. Res. Dairying, Shinfield.

Gadgets.

(See also 71 L 308, 992.)

66. CATLICK, J.

Prístrojový rástový přístroj k záznamu růstu klíčících kořenů filmem. [An apparatus for registering by film the growth of radicles in a continuous-flow solution.] [English, German and Russian summaries 4 p. each.]

Strom. list. Akad. věd. Českos. Věd. Řes. 1958, 31: 247-54, bibl. 17, illus.

An illustrated description is given of an apparatus in which about 100 large seeds such as maize and broad bean can be cultured in a continuous-flow solution and the growth of root tips recorded by a cine camera. Growth was normal as compared with that in the Buchenik-Ulehdla apparatus and with soil, sawdust and un aerated tap water as media.

67. LANE, G. H.

A unique high-pressure field-plot sprayer.

From *Abstr. in Phytopathology*, 1958, 48: 304-5.

A tractor-drawn power sprayer has been devised that provides high-pressure, mechanically uniform application of fungicides to small plots of row crops. It is unique in that the sprayer may be cleaned and the fungicide changed between plots during a single passage through the field. In comparative tests of fungicides for control of purple blotch of onions, the results indicated satisfactory uniformity in spray application and a consequent reduction in experimental error.

68. STENSLIE, G.

An irrigation gauge for commercial use in field and glasshouse practice. [French, German and Spanish summaries 12 lines each.]

J. agric. Engng Res., 1958, 3: 292-8, bibl. 10.

An instrument is described [see H.A., 26: 1374x] which gives a direct indication of the soil moisture deficit under a crop. The results of two summers work at Wellesbourne have shown that readings from the instruments were within half an inch of the measured and calculated values of evapotranspiration from irrigated grass. There was a high degree of correlation between the water loss from the instruments and that from a number of crops grown under glass. [From Author's summary.]

69. DE GRASSY, J.

New lath house design.

Amer. Nurserym., 1958, 108(7): 18, illus.

This ridge-tent-shaped structure, made from 4×1 in. laths, was designed by an Oregon grower to shade young lily plants and beds of seedlings. It is simple to construct and the length can be extended as required. The house gives 50% shade, and has withstood a wind velocity of 70 m.p.h.; it sheds snow readily and causes less drip damage than other types of lath house.

Notes.

70.
 - a ANON.
New Du Pont film for greenhouses.
Agric. Newsl., 1958, 26(4): 12-13, illus.
Weatherable "Mylar" is strong, transparent and resists temperatures from -60° to 200° F.
 - b ANON.
Ein neuartiger Plastikblock. (A new plastic block.)
Schweiz. Gärtnerztg, 1958, 61(34): 2, illus.
An easily erected greenhouse.
 - c ANON.
Micro-determination of iodine in biological materials.
Chilean Iodine Educational Bureau, London, 1958, pp. 40, annotated, bibl. 59.
Including plant materials, pp. 14-22.
 - d ANON.
Glasshouses for municipal horticulture.
Parks, 1958, 23: 637-46, 690-700, 726, illus.
Construction and equipment.
 - e BATE-SMITH, E. C.
The contribution of phenolic substances to quality in plant products.
Qual. Plant. Maveg., 1958, 3/4: 440-55, bibl. 44, illus.
Colour and texture in vegetables; biogenesis of flavonoid compounds.
 - f BOGDANSKI, K. A.
Diverses méthodes de dosage de la vitamine C. (Various methods of determining vitamin C.) [English and German summaries $\frac{1}{2}$ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 227-36, bibl. 15.
 - g BRITISH DRUG HOUSES.
2:3:5-Triphenyl-tetrazolium chloride (tetrazolium salt).
[Mimeo.] *Tech. Inf. British Drug Houses Ltd.* PT/2/573, Poole, Dorset, [1958?], pp. 30, bibl. 139.
The properties of tetrazolium salt and 2 of its derivatives and their uses in biological research are summarized from recent literature. [See also *H.A.*, 27: 2087h.]
 - h ČAJLAHJAN, M. H.
The effect of vitamins on the growth and development of higher plants. [Russian.]
Priroda, 1958, 47(7): 67-72, bibl. 22, illus.
A brief review on the responses of plants to applied vitamins.
 - i CHAMPIGNY, M. L.
Formation des amino-acides au cours de la photosynthèse. (Formation of amino acids during photosynthesis.) [English and German summaries $\frac{1}{4}$ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 91-8, bibl. 5.
Light accelerates amino acid formation in leaves of *Bryophyllum daigremontianum* —. Lab. Photosyn. C.N.R.S., Gif-sur-Yvette, Seine et Oise.
 - j CROWTHER, A. J.
The distribution of particles by a spinning disc. [French, German and Spanish summaries 12 lines each.]
J. agric. Engng Res., 1958, 3: 288-91, bibl. 2, illus.
Pattern of spread of granular fertilizer under different conditions.
 - k VON EULER, H.
Über die Rolle der Ascorbinsäure und anderer Reduktone in Pflanzen. (The function of ascorbic acid and other reductones in plants.) [French and English summaries 4 lines each.]
Qual. Plant. Maveg., 1958, 3/4: 157-60.
A brief review.—Vitamin Inst., Stockholm.
 - l FOWDEN, L.
New amino acids of plants.
Biol. Rev., 1958, 33: 393-441, bibl. 5 pp.
A comprehensive review.
 - m GAETANI D'ARAGONA, G.
Struttura di un grande mercato di consumo: il mercato ortofrutticolo di Napoli. (Structure of a large market for home consumers: the fruit and vegetable market of Naples.) [French, English and German summaries 7, 7 and 6 lines.]
Frutticoltura, 1958, 20: 471-90, bibl. 12, illus.
Scope, administration and economics.
 - n GENEVOIS, L., AND BARAUD, J.
Dosage des aminoacides tyrosine, tryptophane, méthionine et lysine, dans les protéines végétales non hydrolysées. (Determination of the amino acids tyrosine, tryptophane, methionine and lysine in non-hydrolysed plant proteins.) [English and German summaries 8 lines each.]
Qual. Plant. Maveg., 1958, 3/4: 152-6, bibl. 5.

- 6 GILS, A., AND MOUMM, N.
Methodes d'analyses minerales. I. Technique des analyses chimiques rapides adaptée à l'étude de la nutrition minérale des végétaux. II. Dosage du zinc dans les plantes et dans les solutions de culture. (Methods of mineral analyses. I. Technique of rapid chemical analyses suitable for the study of mineral nutrition of plants. II. Determination of zinc in plants and nutrient solutions.) (Flemish summary to part II, 8 lines.)
Publ. I.N.E.A.C. Sér. tech. 54, 1958, pp. 7-19, bibl. 15, and 25-31, bibl. 6.
Part I covers K, Ca, Mg, S, P, ammoniacal N and nitric N.
- 7 GOODWIN, T. W.
Some problems of carotenoid formation in photosynthetic tissues. [French and German summaries 9 lines each.]
Qual. Plant. Mater., 1958, 34: 262-80, bibl. 56.
In higher plants and algae.
- 8 HAMAR, N., NASZÁLYI, E., AND WEBER, A.
C-vitamin különböző módszerekkel való meghatározásának összehasonlítása. (A comparison of different methods of vitamin C determination.) [Russian and German summaries $\frac{1}{2}$ p. each.]
Kert. Kut. Int. Évk. 1957, 2: 141-9, bibl. 8.
Three chemical methods compared with bio-assay of rose hips and green pea.
- 9 HARTSHORNE, J. N.
Pigmentation and sexuality in plants.
Nature, 1958, 182: 1882-3, bibl. 10.
Evidence is sifted concerning the connexion between the occurrence of carotenoids and anthocyanins and the biochemistry of sex in plants.
- 10 HEACOCK, R. A., WAIN, R. L., AND WIGHTMAN, F.
Studies on plant growth-regulating substances. XII. Polycyclic acids.
Ann. appl. Biol., 1958, 46: 352-65, bibl. 50.
Mode of action discussed. [For part XI, see *H.A.*, 27: 3046.]
- 11 KEMP, E. E.
Notes on mist-spraying propagation equipment.
J. roy. hort. Soc., 1958, 83: 427-9, bibl. 2, illus.
In the new propagating houses at the Royal Botanic Garden, Edinburgh.
- 12 KOLE, A. P., AND TCHONG, L. H. W.
Een methode voor vergelijkend onderzoek over de integrale werking en de dampwerking van droge en natte zaadontsmettingsmiddelen. (A method of testing the integral action and vapour action of wet and dry seed dressings.) [English summary $\frac{1}{2}$ p.]
Tijdschr. PlZiekt., 1958, 64: 297-300, bibl. 5, illus.
Laboratory tests using *Glomerella cingulata*.
- 13 LANE, J. R., GULLSTROM, D. K., AND NEWELL, J. E.
Extension of the residue methods for 1,2-dihydro-3,6-pyridazinedione (maleic hydrazide) and N-1-naphthylphthalamic acid (Alanap).
J. agric. Food Chem., 1958, 6: 671-4, bibl. 7.
MH determination extended to tobacco and Alanap determination to many crops including peaches and beans.
- 14 LANE, J. R., GULLSTROM, D. K., AND NEWELL, J. E.
Determination of N-m-tolyl phthalamic acid residues in food crops.
J. agric. Food Chem., 1958, 6: 753-4, bibl. 5.
A sensitive method of determining if Duraset residues persist to maturity in tomatoes, lima beans, etc.
- 15 LEVIN, J. H.
Unit handling of fruit and vegetables.
Agric. Engng St. Joseph, Mich., 1958, 39: 566-8, bibl. 6, illus.
Bulk harvesting and handling, particularly as regards lifting and transporting equipment.
- 16 LYERLY, P. J., AND LONGENECKER, D. E.
Salinity control in irrigation agriculture.
Bull. Texas agric. Exp. Stat., 876, 1957, pp. 20, bibl. 21, illus.
Detailed advice on management.
- 17 MAIER, R. H., AND BULLOCK, J. S.
Determination of zinc in plant materials using ion-exchange chromatography.
Analyt. chim. Acta., 1958, 19: 354-9, bibl. 8.
Quicker than, and as accurate as, the A.O.A.C. method of determining traces of Zn in leaves, etc.
71. MANTHEY, J. A.
The ribonucleic acid content of several plant tissues.
From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlv-xlv.
Privet and tobacco leaves.
- 18 MARSHALL, D. C.
Measurement of sap flow by heat transfer.
Nature, 1958, 182: 878-9, bibl. 5.
Using *Pinus radiata*. [For other work on the same subject, see *H.A.*, 28: 3239.]
- 19 MINISTRY OF AGRICULTURE, LONDON.
Domestic preservation of fruit and vegetables.
Bull. Minist. Agric. Lond. 21, 9th edition, 1958, pp. 108, illus.
Including varieties suitable for various methods of preservation.

- d NAYLOR, A. W., RABSON, R., AND TOLBERT, N. E.
Aspartic-C¹⁴ acid metabolism in leaves, roots, and stems.
Physiol. Plant., 1958, **11**: 537-47, bibl. 26.
Leaves of turnip, beet, tomato, pea, *Lupinus albus*; root tips of *L. albus*, pea and bean, and stems of pea and peppermint.—Nat. Lab., Oak Ridge, Tennessee.
- e PLOCK, H.
Nochmals die Giesser'sche Zapfenschnittschere. (**A further note on new cutters for snagging.**)
Dtsch. Baumsch., 1958, **10**: 255-6, illus.
Noted previously in *H.A.*, 28: 68o.
- f POTTER, E. F., AND WILLIAMS, K. T.
A comparison of a glucose oxidase method with an official method for the determination of fructose.
J. Ass. off. agric. Chem. Wash., 1958, **41**: 681-2, bibl. 8.
Data on 15 fruits and vegetables show good agreement between the methods.
- g SCHUURMAN, J. J., AND KNOT, L.
Het schatten van hoeveelheden wortels in voor wortelonderzoek genomen monsters. (**The estimation of amount of roots in [soil] samples for root investigations.**) [English summary ½ p.]
Versl. landbouwk. Onderz. **63.14**, 1957, pp. 31, bibl. 5, illus.
- h SHANTZ, E. M., POLLARD, J. K., AND STEWARD, F. C.
The growth-promoting activity of coconut milk: synergism between the amphoteric and non-ionic components.
From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xvi.
- i STRIJBOSCH, T., AND DE ZOETEN, J. H.
Automatisering van de watervoorziening onder glas. (**Automation of water supply under glass.**) [English summary 8 lines.]
Meded. Dir. Tuinb., 1958, **21**: 423-4, bibl. 1, illus.
An electronic apparatus for regulated watering is described.
- j URBAN, R.
Physiologische Untersuchungen über einige Flavonoide und Oxyzimtsäuren. I. Auswahl und Identifizierung der bearbeiteten Stoffkomponenten. (**Physiological investigations on some flavonoids and oxycinnamic acids. I. Selection and identification of the constituents to be studied.**)
Planta, 1958, **52**: 47-64, bibl. 31.
Including *Hedera helix*.
- k WALKER, D. R., HENDERSHOTT, C. H., AND SNEDECOR, G. W.
A statistical evaluation of a growth substance bioassay method using extracts of dormant peach buds.
Plant Physiol., 1958, **33**: 162-6, bibl. 11.
Study of variation between samples collected on the same day.
- l WARIS, H.
Simple devices for aseptic culture of seed plants.
Physiol. Plant., **11**: 627-30, illus.
Conical flasks with S or T side tubes for aquatic and land plants respectively.
- m WEIR, R. G.
Urea as a source of nitrogen for plants.
Agric. Gaz. N.S.W., 1958, **69**: 240-2, bibl. 3.
Including biuret damage, especially on citrus.
- n WHITEMAN, T. M.
Freezing points of fruits, vegetables, and florist stocks.
Mktg. Res. Rep., U.S. Dep. Agric. **196**, 1957, pp. 32, bibl. 2.
A detailed account of work noted in *H.A.*, 28: 2946.
- o WIDMER, R. E.
Plastic greenhouse.
Minn. Hort., 1958, **86**: 83, 96, illus.
In many respects the plastic materials tested so far have proved inferior to glass.
- p WITTWER, S. H., AND BUKOVAC, M. J.
The effects of gibberellin on economic crops.
Econ. Bot., 1958, **12**: 213-55, bibl. 204, illus.
A review.

TREE FRUITS, DECIDUOUS.

General.

(See also 1-4, 70m, 168 l, r, u, w, y, 169m, 968.)

72. MINISTRY OF AGRICULTURE, LONDON.

Apples and pears.

Bull. Minist. Agric. Lond. **133**, 3rd edition, 1958, pp. 135, illus., 7s.

The scope of this bulletin remains unchanged since the 1st edition [*H.A.*, 16: 1783], covering every aspect of culture from tree forms and rootstocks to storage and marketing. The text, however, has been extensively revised and brought up to date,

and the chapters on pests and diseases and on machinery have been rewritten.

73. WILHELMINADORP.

Jaarverslag 1957, Proefstation voor de Fruitteelt in de Volle Grond, Wilhelminadorp (bij Goes). (Annual Report 1957, of the Experiment Station for Fruitgrowing in the Open, Wilhelminadorp (near Goes).) [English summary 5 pp.], 1958, pp. 81, illus.

The Experimental Gardens: Rootstock studies were continued and other experiments on apple and

pear varieties, planting systems, tree forms, soil cultivation, disease control (Tuzet delayed mid-summer defoliation of Golden Delicious), green manuring and shelter belts are reported. At Kapelle variety trials with strawberries, raspberries and currants were continued. *Soil studies*: Sprinkler irrigation was more successful with late than with early strawberries. In a dry spring competition between apple trees and grass for N is severe and clean cultivation, with a cover crop in the summer and possibly winter, is recommended as an alternative. Iron chelates were successful in correcting Fe chlorosis in some cases. *Mycological research*: Tuzet applications for scab control have injured fruit skin, retarded shoot growth, discoloured leaves, but improved fruit colour and maturity. Karathane is not recommended for control of pear scab. Captan is most effective against *Phytophthora cactorum*. *Entomological research*: Rhothane (dichlorodiphenyl dichloroethane) and DDT had a long residual effect against *Adoxophyes reticulana* and *Orthosia* spp. Control of *Aphis pomi* was almost complete with 0.16–0.22% of parathion-25% emulsion applied to trees enclosed in glass cambric. *Acarological Research*: PCPBS and chlorocide gave promising control of red spider when applied in the pink bud stage. Transfer experiments indicated that the *Tarsonemus* mite on strawberry is not identical with that on cyclamen: on strawberry 0.2% endrin and 0.25% kelthane gave good mite control when applied after harvest, and preplanting dips of 0.1% and 0.2% endrin were also effective. *Biocoenotic research*: pest populations are related to spraying, pruning and manuring. *Wind protection*: windbreaks for apples, pears, strawberries and vegetables.

74. FRENCH, A. P., AND OTHERS.

Department of pomology.

A.R. Mass. agric. Exp. Stat. 1955-1956, pp. 54-6.

The following results are among those reported: *Apple nutrition*: McIntosh fruit from trees high in N and low in K was significantly poorer in colour than fruit from high N-high K trees or from medium N-high K trees. Fruit from high N-low K trees, which had a respiration rate similar to that from low N-low K trees; fruit from low N-high K trees had the lowest respiration rate and the firmest flesh. *Rootstocks*: Yield records from 11-year-old trees of McIntosh on M.II and VII showed that acre yields were higher on M.VII and compared favourably with those of similar trees on seedling stocks. *Influence of chemical treatments on flowering and fruiting*: Naphthalene-acetamide caused some visible foliage injury to Early McIntosh in 1955. Pre-harvest drop of McIntosh was not controlled by 2,4,5-T or by 2,4,5-trichlorophenoxyacetamide, but was reduced

by NAA and 2,4,5-TP. *Tree fruit metabolism*: Mineral oil sprays (1–5%) and dips of diphenylamine gave better scald control than shredded oiled paper on Cortland and R. I. Greening; application of 3–5% oil to apples before harvest, however, hastened the rate of fruit softening and respiration. The addition of 1% oil to pre-harvest drop sprays increased their tendency to hasten the rate of fruit ripening. *Weed control*: CMU applied in early April to a clean plot of cultivated blueberries at 1 or 2 lb. per acre controlled weeds throughout the summer. Polybor-chlorate applied to lowbush blueberries in May of the year of burn at 400–600 lb. per acre showed promise for bracken control. *Beach plum*: In 2 locations heavy applications of fertilizer did not improve cropping. Yields were increased by placing branches of beach plum blossoms in thickets. *Black root rot of strawberries*: Numbers of meadow nematodes were reduced by soil fumigation with ethylene dibromide or DD. *Blueberry nutrition*: In leaf analyses N showed the greatest variation and P the least.

75. PIENIAŻEK, S. A.

Podróż sadownicza do Chin. (A pomological visit to China. Pts I-III. [From mimeographed English notes pp. 19 4to received from author.]

Post. Nauk rol., 1958, No. 1 (49), pp. 105-21, No. 2(50), pp. 57-80, and No. 3(51), pp. 105-25, all illus.

The author made a 3 months' tour of China travelling 16,000 km., visiting the North-east, North-west and South, and surveying fruit growing therein. Fruit production is stated to be 3,000,000 t. per annum and to be increasing rapidly. The crops in order of importance are Japanese persimmon, jujube, pear, citrus and apple, although there are more jujube than persimmon trees. Apple orchards are of 2 kinds, those producing large Western type apples, originating from European varieties and *Malus pumila* and represented mainly by the old American variety Ralls, and those producing indigenous Chinese type apples. The latter are either large fruited *M. pumila* or small fruited cultivated forms of *M. prunifolia*, *M. asiatica*, *M. micromalus*, and, more recently, crab apples. Most Western type trees are grown on seedlings of *M. baccata*. With the exception of the far North-east, apple scab (*Venturia inaequalis*) is absent from China, while pear scab (*V. pirine*) is common everywhere. Of pears 99% are indigenous and derived from 3 species, i.e. *Pyrus ussuriensis* in the North-east, *P. bretschneideri* in the Centre and *P. serotina* in the South. They are hard and unsuitable for Western palates. The main citrus fruits are mandarin, sweet orange and pommelo. Of stone fruits peach is the most important; and grapes are grown for both table and wine.

Much work has been done in the past 8 years in the investigation of indigenous resources, and the author was able to obtain a considerable collection of new plant material which, it is hoped, will be useful for European fruit growing.

76. FRITZSCHE, R., AND WIRTH, A.
Arbeitstechnik im modernen Erwerbsobstbau. (*Working techniques in modern commercial fruit growing.*)
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 403-7, 423-8.

The authors are chiefly concerned with the man- and machine-hours required in fruit growing, with special reference to lay-out, maintenance and harvesting. It is estimated that 900-1,100 man-hours are needed per hectare per year.—Wädenswil.

77. HILKENBÄUMER, F.
Kalkulation im Erwerbsobstbau. (*Calculations in commercial fruit growing.*)
Paul Parey, Berlin and Hamburg, 1958, 8½×6 in., pp. 80, bibl. 32, DM. 12.60, being *Gärtner-Berufspraxis* H. 31.

In agreement with its title and subtitle, which reads *Expenditure on wages and other costs for the establishment and upkeep of fruit plantations*, this small book consists largely of figures arranged in tables, interspersed among which are short notes and a few plans. So much diverse and up-to-date material on the costing of pome, stone and small fruit has been assembled that it seems hardly possible to ask a question within the author's chosen field, which has not been answered in this comprehensive and precise account. If by its very nature the book is not for light reading, it should nevertheless be well worth studying by growers, teachers and advisers with a slight knowledge of German. V.H.G.

Varieties.

(See also 168m, n, s, z, 169e, g, j, l.)

78. JOHANSSON, E.
Sort-och grundstamförsök med äpple i Sverige 1942-1957. (*Apple variety and rootstock trials in Sweden 1942-1957.*) [English summary 1½ pp., Esperanto summary 1 p.]
Medd. Trädgårdsförs. Malmö **113**, 1958, pp. 40, bibl. 22, illus.

The behaviour of 35 apple varieties on various stocks and at 4 different places has been studied. Varieties recommended for Swedish conditions are Cox's Orange, Cox's Pomona, Cortland, Ingrid Marie, James Grieve, Joy Bells, Melba (red), Ribston and Suislepper. The most satisfactory stocks were A2, A5, M.IV and M.VII.

79. TOENJES, W.
Idared. A promising new apple variety for commercial planting in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **41**: 144-6, illus.

Idared was raised from a Wagener × Jonathan cross by the Idaho Agricultural Experiment Station. Fruits are 2½-3½ in. in diameter, medium bright red, of uniform shape, with a smooth, light waxy skin and white flesh. The flavour is similar to that of Jonathan. The fruit is of good dessert quality, suitable also for cooking and processing. The harvesting season corresponds with that of Northern Spy, and the fruits will store well in ordinary storage or, in cold storage, until June and July. The trees crop heavily and are as disease resistant as Jonathan.

80. TÓTH, E.
Élet- és alaktani összehasonlító vizsgálatok szilvafajtákon. (*Physiological and morphological studies on plum varieties.*) [Russian and German summaries 2½ pp. each.]
Kert. Kut. Int. Évk. 1957, **2**: 11-129, bibl. 82, illus.

The following characteristics have been studied since 1948 in 144 varieties of plum for the purpose of evaluation and certification: Mean flowering period; colouring and ripening of fruit; turning and fall of leaves; self-fertility (supplementary hand pollination increased fruit set by 50%); production (Zöld ringló was the most productive and Vörös szilva showed the highest fruit set); composition (late varieties showed higher nutritive values); injury (the most susceptible to damage caused by weather conditions, by physiological and pathological diseases and by pests was Ageni and the most resistant Bódi); and finally the morphology of the flowers, fruit and leaves.

81. BREVIGLIERI, N.
L'ambiente climatico meridionale e il fabbisogno di freddo delle specie da frutto. (*Southern [Italian] climate and cold requirements of fruit crops.*) [French, English and German summaries 9, 8 and 8 lines.]
Frutticoltura, 1958, **20**: 433-55, illus.

Chilling requirements are stated for different varieties of apricot, chestnut, cherry, quince, persimmon, fig, almond, apple, hazelnut, walnut, olive, pecan, pear, peach and vine. Artificial means of breaking bud dormancy are reviewed. Numerous peach varieties growing in northern, central and southern Italy are compared as regards flower-bud development, drop, and dates and duration of flowering, and certain varieties are recommended for the warmer regions.

Propagation and rootstocks.

(See also 70t, 71e, 78, 168o, q, t, v, 169i, 231, 970.)

82. ZATYKÓ, I.
Gyümölcsfa gyökereztetési kísérletek. (*Experiments on rooting fruit trees.*) [Russian and German summaries ½ p. each.]
Kert. Kut. Int. Évk. 1957, **2**: 189-222, bibl. 10, illus.

Apple, pear, quince, plum, peach, apricot, almond, sweet and sour cherry, mahaleb and walnut trees were used in studies on rooting methods. Of the methods examined, the following was the most successful with most species and varieties. It consisted of cutting a blunt tongue, 4-8 cm. long, in the stem a little above ground level, wedging the tongue apart from the stem and covering the wound with earth. If this was done in the spring, stronger rooting was obtained by autumn than by any other method, and even in walnut 50% successful rooting occurred without irrigation or growth substance treatment. [An English description of the method, with illustrations, is available at the Bureau.]

83. BORDEIANU, T., AND OTHERS.

Scurtarea procesului de producere a materialului săditor pomicol. (Reducing the time required for the production of fruit tree planting material.) [Russian and French summaries $\frac{3}{4}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24(5): 395-405, bibl. 8, illus.

A year in the nursery was saved when direct sown or transplanted seedlings were grafted *in situ* or bench grafted in the winter. Bench grafting was the most economic method. The variety Gold Pearmain was used as scion.

84. KARPOV, G. K.

Qualitative differences in apple buds. [Russian.]

Agrobiologija, 1958, No. 3, pp. 135-6.

A preliminary note showing that when 4 apple varieties were budded on Chinese apple rootstock the percentage of take and vigour of growth were greater with buds taken from the apex than those of buds taken from the base of the shoot. The position of the source of budwood in the crown also affected take and vigour; buds from the upper shoots showed a slightly better take, but those from the lower shoots greater vigour.

85. AOKI, N., AND YOKOYAMA, H.

Production of apple trees on their own roots by long scion-nurse root grafting, and their varietal responses. [Japanese, with English summary $\frac{1}{2}$ p.]

Bull. Fac. Agric. Hirosaki Univ., 1958, No. 4, pp. 36-46, bibl. 21, illus.

During 3 seasons' experiments, in which 17 apple varieties were long scion-nurse root grafted, it was found that Fameuse and American Summer Pearmain developed scion roots very readily, that Ortley, McIntosh, White Pippin, Stayman Winesap and White Winter Pearmain produced roots less readily and that Jonathan scions did not produce any roots. When wire was wrapped around the union to encourage development of scion roots the union became constricted or broke. J.R.L.

86. NICOLIN, P.

Erfolgreiche Auswertung von Möglichkeiten zur Gewinnung von Malus- und Cydonia-Klonenunterlagen. (Apple and quince rootstocks obtained from previously budded clonal material.)

Dtsch. Baumsch., 1958, 10: 225-7.

Plants of Malling IV were raised in the nursery as usual, but the stems were pruned to a height of 20-25 cm. After budding in August the stems were earthed up as if they were in stoolbeds. Before the beginning of winter each plant had yielded 3-4 rooted shoots and no injury had occurred to the scion bud at the buried union. Trials in progress with the propagation of other Malling rootstocks and with quinces appeared promising.

87. CAMPBELL, A. I.

Rootstocks and stembuilders for cider trees: nursery trial.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 48-52, bibl. 4, illus.

A nursery trial is described in which 7 types of seedling [2 crab and the apomictic *M. toringoides*] and clonal [M.XVI, M.XXV, M.3430 and Crab C] rootstocks were tested for their suitability for building standard cider trees. Each type was run-up to form its own stem and was also budded with the stembuilder Bulmer's Norman. Only Crab C was found to be suitable for running-up. All types, however, gave a satisfactory tree when worked with Bulmer's Norman, which by its dominating influence greatly reduced the effect of the rootstock. The Crab C trees and the seven Bulmer's Norman-rootstock combinations have been worked with the cider varieties Tremlett's Bitter, Yarlinton Mill and Stoke Red and are being used in a field trial to compare vigour, cropping and general performance. [Author's summary.]

88. SCHOLZ, E. W.

Physiology of interstem dwarfing in apple.

Diss. Abstr., 1958, 18: 751, being *L.C. Card No. Mic.* 58-1058 of 146 pp.

Anatomical studies of stem cross-sections of M.IX, M.VIII, Clark Dwarf, M.VII and M.II showed that vessel number and cross-sectional area were negatively correlated with tree size, and with the dwarfing propensities of the stems when used as interstocks. Volume of xylem parenchyma was in inverse order. When P³² was introduced to dwarf- and standard-interstock trees via cut roots, upward conduction was slower through dwarf interstocks than through standard interstocks. Downward translocation of P³² through the bark was not impeded by the interstock, but there was greater accumulation in bark and wood of Clark Dwarf interstock than in other parts of the trunk. This accumulation is attributed to greater bark

development, and a larger volume of living tissue of the dwarf xylem. Auxin inhibitors extracted from M.VIII and Clark Dwarf were the most inhibitory of those extracted and those of M.II and VII were the least inhibitory. Applications of TIBA to standard trees induced dwarfing responses, with toxicity symptoms. It is suggested that dwarfing by interstock results from reduced water conduction through interstock xylem, causing reduced shoot growth and earlier flowering. Fruiting is itself a dwarfing process, of which the effect, added to the continuing effects of the interstock, would perpetuate the dwarfing response.—Iowa St. Coll.

89. ORDYNSKI, V. V., AND ZEMLJANOV, V. N.
Renetka purpurovaja as an [apple] rootstock in the Gorky province. [Russian.]
Agrobiologija, 1958, No. 3, pp. 113-17.

This variety, introduced from Siberia, is suitable as an apple rootstock only for the northern areas of the province where there is a permanent snow cover during the winter. For areas with fluctuating winter temperatures seedlings of the local wild forest apple, Kitajka [*Malus prunifolia*] and of the cultivated varieties Antonovka and Anis are recommended.

90. TYRINA, V. A.
Rootstocks for apples in the Primorsk region. [Russian.]
Sad i Ogorod, 1958, No. 8, pp. 54-6.

In the Soviet Far East the generally used, hardy Siberian apple rootstock was found to be not fully compatible with certain scion varieties resulting in loss of hardiness. Trials were conducted with 10 varieties on the rootstocks Siberian and Ranetka Purpurovaja, on the basis of which suitable rootstock-scion combinations are recommended.

91. MAURER, E., FRIEDRICH, G., AND ATHENSTÄDT, H.
Das Verhalten bekannter und neu selektionierter vegetativ vermehrbarer *Malus communis*- und *Malus baccata/prunifolia*-Unterlagen in Marquardt und Wassmannsdorf während der Zeit des Ertragsanstieges. (The behaviour of known and newly-selected vegetatively propagated rootstocks of *Malus communis* and *M. baccata prunifolia* in Marquardt and Wassmannsdorf during the period of rising yields.)
Reprint from *Z. Pflanzenz.*, 1958, 39: 369-402, bibl. 11.

Easily-propagated forms were selected from *Malus communis* seedlings for rootstock studies and named Da clones. Selections made after crossing *M. baccata* with *M. prunifolia* were called Dab clones. Rootstock studies with these clones and Malling rootstocks were set out at Wassmannsdorf in 1937, and at Marquardt in 1942.

Yield and growth data show that M.IX, M.IV and M.XI are the most useful of the Malling series in central Germany, but they have the disadvantage of being susceptible to winter injury. Both Da and Dab clones included forms with promising growth and yield characteristics. Dab clones were in general highly resistant to winter injury, and although Da clones were less hardy, they were less susceptible than Malling stocks.

92. MAURER, E., AND HEFT, L.
Über das Verhalten von Apfelunterlagen-Klonen der Formenkreise *Malus baccata/prunifolia* und *M. communis* in der Baum-schule. (The behaviour of clonal rootstock selections of *Malus baccata prunifolia* and *M. communis* the nursery.)
Reprint from *Z. Pflanzenz.*, 1958, 39: 357-68, bibl. 8.

Seedlings of the cross *Malus baccata* × *prunifolia* were selected as winter-hardy rootstocks (Dab clones) and compared in the nursery with Malling stocks and selections from *Malus communis* (Da clones). Growth of Dab clones finished early in the autumn. Growth before and up to 2 years after budding with 5 scion varieties was measured and is tabulated. Growth of the Dab selections was in general moderate to very vigorous, and compared favourably with that of Malling rootstocks.

93. DANIEL, L.
Egyes alma- és körtealanyok értékelése termőrefordulásig Nyírségi viszonyok között, a ráoltott nemes fajták alapján. (An evaluation of some apple and pear rootstocks in Nyírség.) [Russian and German summaries 1½ and 2 pp. respectively.]
Kert. Kut. Int. Évk., 1957, 2: 223-47, bibl. 11, illus.

In N.E. Hungary 10 apple varieties have been tested since 1947 on the following 16 vegetatively propagated rootstocks: 11 M types, 3 Transylvanian varieties (Orbai-, Sólyom- and Transylvanian sweet), wild native and wild Italian apple. The climate of the region is dry continental with sand storms in the spring. Growth was most vigorous on M.XVI, IV and V, and least vigorous on Transylvanian sweet apple, IX and III. Flowering was most profuse on IX, then on IV, II, Orbai, VII and V, and very poor on native wild apple, XII, Italian wild, X and Transylvanian sweet. Fruit set was very good on IV and II and poor on Transylvanian sweet, native wild, X, XII and III and Italian wild. Yield was highest on II, high on IV, Orbai and IX, and low on III, XII and native and Italian wild apples. These facts and the bearing age in each case allow of individual rootstock evaluation. Of pear rootstocks quince A, C and Zalaegerszegi and the wild pear were tested, with quince A showing the best promise and the wild pear requiring further testing.

94. GUR, A.

The compatibility of the pear with quince-rootstocks. [Hebrew, with English summary 8½ pp.]

Spec. Bull. Israel Minist. Agric. agric. Res. Stat. **10**, 1957, pp. 108, bibl. 194, illus.

Under Israeli climatic conditions most pear varieties grafted on quince stocks suffer from early decline. In this thesis detailed evidence is presented to support the following theory on the causes of this incompatibility. (1) The cyanogenetic glucoside prunasin in the quince stock is conducted into the phloem tissues of the pear scion adjacent to the union, where it decomposes, liberating hydrocyanic acid. The enzymatic process of decomposition is hastened by high temperatures. Pear varieties vary in their ability to decompose β -glucosides, owing to varietal differences in the content of a water-soluble inhibitor to the activity of β -glycosidase. The effect of temperature on the ability to decompose prunasin varies with variety. Moreover, a high decomposing power is related to a high ratio of free to bound phenols in the spring. (2) The HCN derived from prunasin prevents cambial activity at the union, causes anatomical disturbances in the phloem and xylem near the union and gradually destroys the phloem above the union. (3) The transport of water and minerals from stock to scion is restricted, and the transport of assimilates from scion to stock is checked. (4) Depletion of sugars in the stock results in decomposition of prunasin and liberation of sugars and HCN. This process is gradual at temperatures below 25° C. and rapid at higher temperatures. (5) The free HCN in the stock kills large areas of phloem, finally resulting in death of the whole tree. It is concluded that determination of the ability of pear bark to decompose amygdalin, together with measurements of the maximal distance from the graft union at which prunasin may be detected in the pear bark, may be used in evaluating the compatibility of pear varieties with quince stock. Determination of free and bound phenols in the pear bark in spring may be used for the same purpose. For evaluation of compatibility of quince types as rootstocks, prunasin content and capacity for decomposing β -glucosides in their bark can be used. Heavy dressings of sulphate of ammonia resulted in a much higher prunasin content in the quince root-stocks than no N fertilizer. Cultural methods of reducing incompatibility are discussed.

95. KARNATZ, H.

Über das Verhalten einiger Birnen-Stamm-bildner gegenüber tiefen Temperaturen. (On the response of some pear stem-builders to low temperatures.)

Mitt. ObstbVersuchsrings Jork, 1958, **13**: 225-9, bibl. 2, illus.

In experiments with a mobile freezing chamber it was shown that certain pear stem-builders vary in frost resistance from one to another and from year to year. None of the stem-builders tested improved the hardiness of a tender scion variety (Köstliche aus Charneu), at least during the first year or two after budding.

96. OL'HINA, E. I.

Grafting into the crown of resistant rootstocks as one of the methods of increasing hardiness in pears. [Russian.]

Agrobiologija, 1958, No. 3, pp. 69-75, bibl. 9, illus.

In work at Leningrad no improvement in frost resistance was obtained by crown grafting a hardy pear variety onto *Pyrus communis* compared with grafting at the root neck, whereas with the insufficiently hardy variety Bere zimnjaja Mičurina a considerable improvement was obtained.

97. WIERSZYŁOWSKI, J., RUSEK, Z., AND BORYS, M.

Obserwacje nad kiełkowaniem stratyfikowanych nasion gruszy kaukaskiej poddawanych działaniu syntetycznych substancji wzrostowych, niskich temperatur i moczenia. (Observations on the effect of growth substances, low temperatures and steeping on the germination of stratified seed of Caucasian pear.) [English and Russian summaries ¼ p. each.]

Roczn. Nauk rol., Ser. A, 1958, **77**: 503-17, bibl. 19, illus.

Soaking the seed before stratification in 62.5 or 125 p.p.m. NAA for 24 hrs, or in distilled water for 120 hrs, had a favourable effect on germination. High concentrations of NAA and 2,4-D inhibited germination while treatment at -2° C. for 48 hrs had no effect.

98. HARTMANN, H. T., AND HANSEN, C. J.

Rooting pear, plum rootstocks.

Calif. Agric., 1958, **12**(10): 4, 12, 14-15, illus.

The effect of 3 treatments on rooting of autumn-collected cuttings of pear and plum varieties was studied. Variolosa pear and Brompton plum showed the best rooting when planted in the nursery immediately after collecting on November 20th. Old Home pear and White Damson and Santa Rosa plum gave the best rooting when planted in the nursery after 4 weeks' storage in damp moss at 65° F. Results after storing the cuttings for a further 10 weeks at 40° F. were not satisfactory. [Work on Marianna plum has been abstracted in *H.A.*, 28: 3316.]

99. GRAHAM, S. O.

Factors in propagating presumably virus-free *Prunus* understock clones by softwood cuttings.

Bull. Wash. agric. Exp. Stat. **581**, 1958, pp. 66, bibl. 70, illus.

The critical environmental and physiological factors necessary for successful vegetative propagation were studied with virus-free (ring spot) *Prunus mahaleb*, *P. avium*, *P. persica* and *P. cerasifera* var. *myrobalan*. Softwood cuttings of *Prunus* spp. having 2 or 3 leaves with a smooth basal cut just below a bud, rooted very satisfactorily when treated with certain chemicals. A paraffin emulsion (antitranspirant) diluted 1 part to 30 parts water and used as a foliar dip, reduced desiccation of *Prunus* cuttings until roots were produced. Foliar applications of 5,000 p.p.m. sucrose, 1,000 p.p.m. urea, 25 p.p.m. thiamine and 25 p.p.m. nicotinic acid were combined with basal applications of 3,000 p.p.m. IBA and/or 200 p.p.m. adenine. There was little or no rooting without IBA, but in the presence of IBA rooting was highly significant with thiamine, adenine and urea, and significant with nicotinic acid. The greatest number of roots per rooted cutting was obtained with thiamine plus IBA treatment. Breaking of bud dormancy was related to N utilization, and 73% of the cuttings broke bud dormancy after treatment with urea combined with sucrose plus thiamine. Cuttings with the apical bud, of a clone of *Prunus mahaleb* which was difficult to root, gave 70% rooting with foliar application of nutrients, and IBA treatment; the same level of rooting was obtained in such cuttings treated with IBA plus adenine. Cuttings without an apical bud did not root with IBA alone, but gave 80% rooting when treated with IBA and adenine. Adenine plus IBA gave significantly better rooting percentages than hormone alone with succulent cuttings, but as the cuttings hardened the difference between the treatments decreased. Root length and number per cutting was greater when adenine was used. Adenine influenced the site of root initiation in one *P. mahaleb* selection. Satisfactory rooting (70%) of *P. avium* was obtained with a second application of IBA powder 3 weeks after the initial treatment. All unrooted cuttings treated a third time after the 5th week rooted by the end of the 8th week. The use of adenine with the IBA preparation delayed rooting. Foliar application of nutrients to softwood cuttings of *P. persica* combined with hormone dip gave satisfactory rooting throughout the growing season. Softwood cuttings of *P. cerasifera* var. *myrobalan* made from vertically-growing shoots rooted very little (5%) unless the apical bud was present (100%). Rooting with horizontal shoots was equally good, with (90%) or without (85%) the apical bud. After treatment with IBA rooting was 100% regardless of habit of shoot growth.

Adenine inhibited rooting when used alone and retarded rooting when used with IBA.

100. DIKSHIT, N. N.

Propagation of some commercial varieties of plum (*Prunus* sp.) by stem cuttings, with beta indolyl butyric acid.

Sci. and Cult., 1957, **22**: 391, bibl. 3.

Nine-inch, dormant cuttings were treated with β IBA, 30 p.p.m. for 24 hours before planting. Of 9 varieties tested, Large Red, Large Yellow and Alpha showed high rooting percentages of 92.7, 91.7 and 73.0% respectively. [See also *H.A.*, **23**: 2546 and **27**: 2107.]

101. GRAY, R. A.

Breaking the dormancy of peach seeds and crab grass seeds with gibberellins.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xl-xli.

A concentration of 10 p.p.m. Gibrel in agar medium broke dormancy of peach seeds, and gave 35% germination during 13 days at 25° C. A similar level of germination in control seeds was only obtained after 2 months' cold storage. Crabgrass seed germination on filter paper moistened with 100 p.p.m. Gibrel was 50% after 2 weeks compared to 19% for the controls. At 1,000 p.p.m., Gibrel gave 63% germination. In soil plots, crabgrass germination was increased 3½ times by applications of 1,000 p.p.m. Gibrel.—Merck and Co. Inc., Rahway, N.J.

102. KUZNECOV, V. V., AND LEJN, A. N.

Cherry cultivation in Uzbekistan. [Russian.]

Tr. Plod.-jagod. In-ta AN UzSSR, 1956, No. 21, pp. 129-35, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 94,107.

Factors limiting the growing of this crop are discussed and the importance of suitable rootstocks is stressed. On well irrigated grey soil both mahaleb and wild cherry can be used as rootstocks, but on less fertile or stony soils, or where limited or no irrigation is applied, mahaleb only is suitable, and on saline soils the Samarkand sour cherry. As the cherry is susceptible to soil salinity, Cl content should not exceed 0.01-0.04%. On irrigated fertile soils the ground water should not rise above 1.5-2.0 m., and on stony soils 1 m. Irrigation should be provided throughout the growing season.

103. STANCIU, G.

Comportarea cireşului şi vişinului altoit pe mahaleb în bazinul pomicol Lovrin. (The behaviour of sweet and sour cherries on mahaleb in the Lovrin region.) [Russian and French summaries ½ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), **24**(5): 407-12, bibl. 10.

Mahaleb was found to have a growth rhythm incompatible with that of sweet cherry and this

resulted in a thickening at the graft union which impeded sap circulation and caused the premature death of many trees after 12-15 years of production. The author suggests the replacement of mahaleb by wild cherry for use as a rootstock for sweet cherry but not for sour cherry.

Climate and growth

(See also 21, 1955, a.)

104. ROBERTS, H. S.

The effect of certain meteorological conditions on Summer apple yield.

J. hort. Sci., 1958, 33: 225-36, bibl. 3.

Of 21 meteorological factors examined in the Nelson district of New Zealand during the period 1953-55, only 2 were found to have a significant effect on the yield of Summer apple trees. (1) Total average temperature from July to December in the year immediately preceding harvest: continuous warm weather was more beneficial than a short period of hot weather. (2) The number of days of frost in July, 21 months previous to harvest: the yield decreased as the number of days of frost increased, the effect being greater with an increasing level of fertilization. Two non-meteorological factors were also found to affect yield significantly. (1) the yield 2 years previous (indicating a biennial bearing tendency), and (2) a general ageing trend.—Appl. Maths Lab., D.S.I.R., N.Z.

105. SANCHEZ, P.

Untersuchungen über die Appleologie der Vererbung verschiedener Obstsorten und Appleologie von Ökologischen Faktoren. [The influence of ecological factors on the distribution of various fruit trees and apple varieties.] [English, French and Spanish summaries 7-8 lines each.]

Mém. Kusternaburg, Ser. B. 1958, 8: 214-36, bibl. 36, illus.

Three ecological factors, precipitation, air temperature and soil type were examined and the following relationships with apple and plum (chiefly damson, Maraschino and Reine Claude) were established. (1) Apples were mostly grown in areas with high rainfall. (2) The proportion of apples and plums in the total fruit area increased with temperature. (3) In general, rainfall had a greater influence on fruit distribution than air temperature. (4) There was no relationship between soil type and fruit species grown. (5) Varietal distribution in apples was chiefly influenced by water requirements, with Boscopie and Louise Ravoir in high rainfall areas, and Landreopie, Urdampierre and Orlane in areas of relatively low rainfall. (6) In conclusion it is suggested that apple varieties should be grouped ecologically according to their water requirements, and plums according to their tem-

perature requirements.—Inst. Obstb. u. Baumsch., tech. Hochsch., Hannover.

Other growth phenomena.

106. EMMERT, F. H.

Hardiness studies of apple twigs and blossoms.

Diss. Abstr., 1958, 18: 1926-8, bibl. 1, being L.C. Card No. Mic. 58-784 of 92 pp.

Hardiness studies with twigs of 55 apple varieties and seedlings were carried out in autumn, mid-winter, late winter and early spring by electrolytic techniques. Twig length and diameter affected the extent of electrolytic diffusion. The degree of hardiness of most varieties tested changed considerably with time. There was a tendency for all the varieties which were very hardy in the autumn to become more tender; many of the varieties tender in the autumn increased in relative hardiness but others showed no or irregular changes. A classification of varieties based on relative hardiness has resulted in 3 general groups. The first contains varieties which are relatively hardy in autumn tests, because they mature rapidly in the early part of the dormant season. A second group consists of varieties which, given a chance to mature fully, possess a great capacity for resistance to low temperatures. The third group contains varieties which lose their resistant qualities slowly at the end of the dormant season. Ten varieties were selected as suitable interstocks on account of their hardiness throughout the season. Twigs from trees grown in sward were considerably more hardy in the autumn than were twigs from clean cultivated or mulched trees. Blossom hardiness was tested at 4 stages of flowering, and the stamen was shown to be the most resistant organ; the style was generally the most tender, but the hardiness of stamen, style and ovary wall varied with time. The style was harder at the start of flowering than at the end in most varieties, while the ovary wall showed the opposite trend. Hardiness changes in stamens showed no general tendency. [See also H.A., 24: 2231.]—Ohio St. Univ.

107. AOKI, N., AND YOKOYAMA, H.

The morphological analysis of top and root of two old "Ralls" apple trees. [Japanese, with English summary 1½ p.]

Bull. Fac. Agric. Hiroaki Univ., 1957, No. 3, pp. 40-51, bibl. 11, illus.

The tops and roots of 2 apple trees, variety Ralls, 65 and 54 years old respectively, were measured and weighed. Both trees had a large proportion of trunk and main limbs, the laterals being only 13% and 11% by weight of the top part of each tree. The ratio of the weight of the top of the tree to the roots was 4:1 in both cases. The older tree had many large roots in the top 30 cm. of soil but, if these were disregarded, the greatest weight of roots occurred at a depth of 60-90 cm. J.R.L.

108. MARTIN, J. T., AND BATT, R. F.

Studies on plant cuticle. I. The waxy coverings of leaves.

Ann. appl. Biol., 1958, **46**: 375-87, bibl. 36.

The waxy coverings of the leaves of different species of plant have been fractionated into wax, acidic, volatile and oil components. The levels of the waxy deposits on the leaves and the relative proportions of the principal components of the waxy coverings differed widely. Wax predominated in the waxy coverings of the leaves of cabbage and cauliflower and acidic materials in those of apple and pear. The role of ether-soluble acidic constituents in a possible defensive mechanism of leaves against fungi, the contribution of water-soluble acidic constituents to the toxic action of copper fungicides and the influence of the waxy covering on spray deposition, phytotoxicity and the behaviour of DDT deposits on leaves are discussed. Earlier work on the nature of leaf wax components is reviewed. [Authors' summary.]—Long Ashton Res. Stat.

109. SUTA, A., MODORAN, I., AND DUMITRACHE, I.

Contribuții la studiul sistemului radicular al pomilor. (A study of the root system of fruit trees.) [Russian and French summaries 10 and 1 pp. respectively.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), **24**(5): 429-57, bibl. 8, illus.

The vertical and horizontal distribution of the roots of plum, standard and dwarf apple and pear trees was studied by excavation. The roots were found to represent 27-35% of the total weight of the trees, the percentage being higher on poorer soils.

110. KARJAGDYEV, N. N.

A case of pleiocotyly in seedlings of white mulberry (*Morus alba*). [Russian.]

Izv. AN Turkm SSR, 1956, No. 4, pp. 74-5, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 93,622.

A morphological description is given of mulberry seedlings with 3 and in some cases 4 or 5 cotyledons. In some of the seedlings anomalies in the phyllotaxy occurred, the first pair of permanent leaves being alternate instead of opposite.

111. MOCHIZUKI, T., AND HANADA, S.

The anisophylly of the lateral shoots of apple trees and the effect of soil moisture. [Japanese with English summary ½ p.]

Bull. Fac. Agric. Hirosaki Univ., 1957, No. 3, pp. 1-8, bibl. 9.

During an investigation into the size of leaves on the shoots of Indo apple trees growing under 3 different soil moisture conditions it was found that the "small leaf" on the shoot was always the 12th from the base, and that its position did not vary with soil moisture conditions. It is stated that the leaves of shoots may be divided into two groups,

those from the base of the shoot to the "small leaf" whose growth is controlled by the food reserves laid down the previous year, and the leaves above the "small leaf" whose growth is controlled by the food supplies available at the time [see also *H.A.*, 27: 2126]. There was no correlation between leaf weight and soil moisture so it is presumed that leaf weight is correlated with food supply. J.R.L.

112. NENAJDENKO, V. P.

The effect of the size of planting holes on the growth of apricot in sandy soils. [Russian.]

Nauč. Tr. Ukr. n-i. St. Vinogr. i Osv. Peskov, 1956, No. 6, pp. 42-6, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 94,108.

In sandy soils in the Lower Dnieper area unirrigated apricots planted in holes 2 × 1 m. in area and 2 m. deep had a better root system and more vigorous growth than those planted in the usual 1 × 1 × 1 m. holes.

113. PENÜR, E.

Mitteilung über die Wirkung von Gibberellin bei: *Fagus silvatica*, *Quercus borealis*, *Quercus robur* und *Ficus carica*. (The effect of gibberellin on *Fagus silvatica*, *Quercus borealis*, *Q. robur* and *Ficus carica*.)

Saatgut-Wirtsch., 1958, **10**: 220-2, bibl. 21, illus.

One treatment daily of 5-month-old fig seedlings with 100 p.p.m. gibberellin for 12 weeks caused a very considerable increase in the length of the shoots and some increase in the size of the leaves.—Forstl. ForschAnst., Munich.

Pollination.

(See also 169f.)

114. SEDOV, E. N.

Selective fertilization of new apple varieties and the selection of pollinators. [Russian.]

Agrobiologija, 1958, No. 3, pp. 131-5, illus.

The method of work is described, 13 new varieties being used. In most cases the highest percentage of fruit set and the greatest number of normal seeds were obtained from pollination with mixed pollen of 2-3 varieties.

115. DŽENEEV, S. JU.

The development of apple fruits in relation to the pollinating variety. [Russian.]

Agrobiologija, 1958, No. 3, pp. 129-31.

The pollinating variety is shown to affect the size and chemical composition of apples and, when planting new orchards, this should be considered as well as compatibility and date of flowering.

116. WILSON, D.

Male sterility in Bristol Cross pear.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 52-6, bibl. 3.

A study of pollen development, pollen germination and controlled pollinations with Bristol Cross pear has shown that this variety may, for all practical purposes, be regarded as male sterile, since it produces only 5 to 10% of viable pollen grains. Although Bristol Cross is itself capable of setting heavy crops when cross pollinated, it should not be regarded as a pollinator for Conference or any other pear variety. The reasons for the high percentage of non-functional pollen grains are thought to be genetic, but further experiments will have to be undertaken to confirm this hypothesis. [Author's summary.]

117. NAGY, P.
Metaxenia vizsgálatok néhány körtefajtánál.
(Studies on metaxenia in some pear varieties.)
[Russian and German summaries $\frac{1}{2}$ p. each.]
Kert. Kut. Int. Évk. 1957, 2: 261-80, bibl. 7.

Results are given of a year's work on cross-pollination of 8 pear varieties. Changes were noted in the fruits, some of which resembled those of the pollinators. Individual pollinators had different effects on the receptors and the receptors also reacted differently to the pollinators. From the literature it appears that the effect of the male parent on the fruit of the mother plant was greater in a more continental climate.

118. GORTER, C. J., AND VISSER, T.
Parthenocarp of pears and apples.
J. hort. Sci., 1958, 33: 217-27, bibl. 11.

Over the period 1948-55 a study was made of the ability of 21 varieties each of apple and pear to set parthenocarpic fruit, with and without auxin application. In the experiments on vegetative parthenocarp (i.e. without pollination or other externally applied stimulus) all the pear varieties set some parthenocarpic fruitlets, but only 12 of the apple varieties did so. Mature parthenocarpic fruits, however, were produced by only 9 pear varieties (including *Précoce de Trévoux*, *Primaston Duchess*, *Conference* and *Comtesse de Paris*) and 5 apple varieties (*Gladstone*, *Laxton's Superb*, *Winter Gold Pearmain*, *Yellow Transparent* and *Ellison's Orange*).

Only one variety, *Précoce de Trévoux*, produced parthenocarpic fruit every year, the amount produced varying from 7 to 24%. The parthenocarpic set of other varieties also varied widely from year to year. It is suggested that the large varietal differences in ability to set fruit parthenocarpically may be largely controlled by the longevity of the buds. Yearly differences show that environmental conditions are also an important factor. In experiments with growth substances it was found that only in certain varieties (*Winter Gold Pearmain* and *Laxton's Superb* apples) did treatment induce a slightly higher production of parthenocarpic fruit than in the controls. Setting of fruitlets, however, was generally improved by growth substances, as

a result of delayed abscission. Frost never induced parthenocarpic.—Lab. TuinbPl., Wageningen.

Nutrition.

(See also 168d, e, 169d.)

119. LYSENKO, T. D.
The soil nutrition of plants and the fertilizing of orchards. [Russian.]

Agrobiologiya, 1958, No. 3, pp. 87-94.

In orchards on acid podzolic soils well decomposed organic matter, such as FYM-soil or peat compost, at 7-10 t. per ha. mixed with 3-5 centners of ground limestone, 1-2 cnts phosphoric meal and 9-5 cnts superphosphate discied into the soil to a depth of 3-7 cm. was as effective in increasing yields as much higher rates of FYM.

120. BEATTIE, J. M.
Nitrogen fertilization of apples.
Bull. Ohio agric. Exp. Stat. 817, 1958, pp. 22, bibl. 7.

A survey of the N status of Ohio apple orchards is reported, and a summary is given of experiments on the effects of different kinds and amounts of N fertilizers (including urea sprays) on tree growth and yield and fruit quality. Methods of estimating N needs are evaluated.

121. BAXTER, P.
Fertilizers and apple storage.
J. Agric. Sci., 1958, 56: 451, bibl. 1.

Jonathan apples harvested from 2 fertilizer trials were cold stored for 7 months. Apples from trees not receiving N were slightly more attractive and a little redder than those from trees receiving 2 lb. sulphate of ammonia per tree per year, but there was no difference in storage life. Three foliage sprays of urea did not improve the fruit colour compared with fruit from trees receiving soil applications of N. J.R.I.

122. ABE, I., AND MORI, H.
Studies on the leaf analysis of apples. II. Effects of nitrogen nutrition on mineral composition of leaves, growth, yield and fruit quality of apple trees. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Sci. Japan, 1958, 27: 84-93, bibl. 19.

Spring applications of 5 levels of ammonium sulphate were made annually and differences in leaf content became apparent after 3 years. A positive relation between leaf N and growth, and a negative relation between leaf N and fruit quality were observed. [For part I, see H.A., 24: 2265.]

123. VOZNIKOVSKAJA, JU. M., AND JAZVICKIJ, M. N.

The effect of various fertilizers on biological processes in the rhizosphere of apple trees and on yield. [Russian.]

Agrobiologiya, 1958, No. 3, pp. 95-8.

FYM + superphosphate + lime were as effective in

increasing apple yields as NPK + lime + annual application of ammonium nitrate. Additional annual application of ammonium nitrate to trees which received the FYM + superphosphate + lime mixture did not produce further yield increases. FYM increased the number of ammonifiers, fungi and butyric acid bacteria. Denitrification was greater where N was applied annually and the absence of N in the FYM + superphosphate + lime mixture was compensated for by atmospheric N fixation.

124. PRIJMAK, A. K., AND SUSLOVA, N. A.

The effect of mineral fertilizers on the microflora and the humus content of soil under fruit trees. [Russian.]

Agrobiologija, 1958, No. 3, pp. 142-3.

An annual application of 90 kg./ha. each of N, P and K, compared with no fertilizers, resulted in a considerable increase in the humus content and microbial activity of the soil and in the root and shoot development and yield of apple, pear and plum trees.

125. SHIBUKAWA, J., AND OTHERS.

Studies on leaf analyses of apple trees. (II) Hunger signs in apple (2). [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1958, 27: 81-8, bibl. 17, illus.

Leaf symptoms of N, P, K, Ca and Mg deficiencies in very young trees of Jonathan, Ralls and Indo are described with coloured illustrations. The nutrient contents of leaves showing visible deficiency symptoms were as follows: 1.5-2% N, 0.09-0.13% P, 0.6-1% K, 0.6% Ca, 0.2-0.29% Mg. [For part 1 see *H.A.*, 26: 1516.]

126. MOCHIZUKI, T., AND HANADA, S.

The phosphorus nutrition of apple trees. Part I. Effects of phosphorus concentration in culture solutions. [Japanese, with English summary 1 p.]

Bull. Fac. Agric. Hirosaki Univ., 1958, No. 4, pp. 1-18, bibl. 41.

One-year-old Jonathan apple trees were grown in culture solutions containing 0, 4, 20 or 40 p.p.m. PO_4 . The trees in the solution with no P ceased growing in late July and P deficiency symptoms then gradually appeared. Trees receiving 4 p.p.m. PO_4 showed a gradual decline in growth but no deficiency symptoms. The N absorption of trees receiving no P was greatly reduced, and with the other treatments it was proportional to the P supply. The uptake of K, Ca and Mg was also affected by the P supply. Analyses of the mineral content of various parts of the trees did not show the same trend. The N : P ratio in all parts of the trees increased in inverse proportion to the amount of P supplied. The P reserves in the form of inorganic phosphoric acid and phytin were greatest in the trees supplied with the most P. The ratios of total

N to soluble N and protein N were lower in the leaves and shoots, but higher in the woody parts of the trunk and roots, of trees receiving little P than those of trees receiving the higher rates. J.R.L.

127. CRAICIU, E.

Influența îngrășămintelor în pepiniera de duzi. (The effect of fertilizers in mulberry nurseries.) [Russian and French summaries $\frac{3}{4}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24(5): 603-23, bibl. 6.

Rotted FYM and N, P and K were used at various rates. All treatments gave positive results, but the best were obtained with FYM at 40 and 60 t./ha. applied in the autumn. Mineral fertilizers in the form of ammonium nitrate, superphosphate and potash salt at 240 kg./ha. of N and 120 kg./ha. each of P_2O_5 and K_2O gave almost as good results as FYM at 40 t./ha.

128. IONIȚĂ, C.

Despre sistemele de întreținere a solului în livezile tinere. (Soil management in young orchards.) [English, French, Russian and German summaries $\frac{3}{4}$ p. each.]

Grăd. Via Liv., 1958, 7(4): 36-41 + summaries.

Experimental data are given indicating that clean cultivation between rows is advisable where no erosion problem exists, but where rainfall is high, non-competing row crops including peas should be grown.

Pruning and training.

(See also 168p, 169k, 262.)

129. ČERNÍK, V.

Zlepšené tvarování polopřirozených kornů ve školce. (An improved method of training semi-natural crowns in the nursery.) [English Russian and German summaries $\frac{3}{4}$ p. each.] *Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba*, 1958, 31: 101-16, bibl. 27, illus.

Good results were obtained in experiments conducted at Průhonice to widen the crotch angle and produce strong framework branches of equal length in apple, pear and plum trees in the nursery. The trees were headed back to the desired stem height plus 7-8 buds. The 2 shoots immediately below the leader were pinched back twice during the growing season, i.e. when 10 and 20 cm. long, and the leader was pinched back when it had reached about $\frac{1}{3}$ of its expected annual growth. The shortened side shoots were retained as strengthening and fruiting branches.

130. HOBBS, E. W., AND CATLOW, E.

The performance of three varieties of dessert apple trees at Long Ashton under different systems of planting, spacing and shaping.

J. hort. Sci., 1958, 33: 254-63, bibl. 5.

In trials conducted in the South-West, with an

average rainfall of 36 in., 4 planting systems were compared for Cox, Laxton's Superb and Winston on M.II and M.IX. The bush plantation interplanted with fillers (75 permanent trees plus 227 fillers per acre) became overcrowded by the 10th year. Plantations of single cordons and dwarf pyramids, both on M.II, produced yields of 200 bu. or more per acre by the 6th year, a yield not reached by the extensive systems (bush trees on M.II with or without fillers) until the 9th or 10th year. The filler trees on M.IX cropped at an intermediate level. Winston cropped heavily as a filler, pyramid or cordon tree but, as a bush tree on M.II, yield, fruit size and fruit colour were below standard. The results indicate that the relatively higher costs of planting and pruning pyramid trees are more than offset by early and heavy cropping and by the fact that all operations can be carried out within easy reach of the ground. —Long Ashton Res. Stat.

131. LYSENKO, B. F.

How to prevent the breaking of framework branches in apple trees. [Russian.]

Priroda, 1958, 47(7): 113.

Growth substances were used to encourage wide-angled crotches in the primary branch framework. In the second spring after grafting a thin strip of a paste containing 0.1 or 0.05% heteroauxin or 0.01% 2,4-D was applied to the upper side of shoots when they were 4–5 cm. long, from the base for $\frac{2}{3}$ of their length. Cell growth and division in the cambium were more intensive on the treated upper side than on the lower side, and as a result of this uneven development the branches grew out at a wider angle.

132. RIGITANO, O.

Resultados experimentais relativos à poda da figueira, variedade Roxo de Valinhos. (Experimental results relating to pruning of the fig variety Roxo de Valinhos.) [English summary $\frac{3}{4}$ p.]

Bragantia, 1957, 16: 109-25, bibl. 6, illus.

Reducing the severity of pruning, by leaving 20, 30 or 40 branches per tree instead of the usual 10, increased fruit yield, slightly decreased fruit size, and led to earlier ripening of the fruit. The greater the number of branches left, the more marked were these effects, but differences were smallest between the 30-branch and 40-branch treatments.

Spraying for cultural purposes.

(See also 169b.)

133. LOMBARD, P. B., MITCHELL, A. E., AND CARDINELL, H. A.

Chemical thinning of peaches using naphthaleneacetic acid, N-1-naphthyl phthalamic acid, and 3-chloro IPC.

Quart. Bull. Mich. agric. Exp. Stat., 1958, 41: 147-56, bibl. 17, illus.

Trials at 3 localities in 1955–57 on Halehaven and Redhaven peaches gave the following results. (1) NPA applied 3 days after full bloom thinned the fruit excessively in some cases but insufficiently in others. (2) 3-chloro IPC applied 4 weeks after flowering did not thin the fruit sufficiently to eliminate hand thinning. It increased the size of Redhaven fruit and hastened ripening, as measured by firmness of fruit, in both varieties, but many misshapen fruit developed. (3) NAA was the most satisfactory thinning spray, and when applied 6 weeks after full bloom it caused significant fruit thinning of both varieties with no phytotoxic effects of commercial importance. J.R.L.

134. BOTTING, G. W., AND BASKETT, W. J.

Blossom thinning sprays increase fruit size of plums.

J. Dep. Agric. S. Aust., 1958, 62: 12-13, illus.

In trials with Angelina Burdett and Black Diamond plums blossom thinning was successful using 4 pints of 2.5% commercial DNC in oil per 100 gal. water applied to the trees at full bloom. Trees sprayed at 8 pints per 100 gal. were over-thinned. With Japanese plums, 4–6 pints was successful plus additional light hand thinning.

135. FACCIOLO, F.

L'ormone 24 A su piante di pero e melo contro la caduta anticipata della frutta. (Hormone 24 A for prevention of fruit drop in pear and apple trees.) [French, English and German summaries 7, 7 and 6 lines respectively.]

Frutticoltura, 1958, 20: 375-6.

A mid-September treatment of pear trees with a German product Obsthormon 24 A [containing NAA] at 50 c.c. per 100 l. almost eliminated the heavy natural fruit drop in Bergamotte Espéren and gave excellent results with Passe Crassane. In Golden Delicious apples, the same treatment completely arrested fruit drop within 3 days, and was almost as successful with Black Ben Davis. Results with Rambour were slightly inferior, but there was some evidence of improvement of fruit colour, which was a notable feature of fruit from treated trees of Black Ben Davis.

136. FARMER, A., HAWKINS, J. E., AND ROBERTS, G. E.

2,4,5-T hastens maturity of Oullins and Moorpark apricots.

Orchard. N.Z., 1958, 31: 275-9, bibl. 2, illus.

For 2,4,5-T to be effective, any necessary thinning should be done before spray application and sprays should be applied at the start of stone hardening. A single application of 25 p.p.m. 2,4,5-T significantly increased the size of Moorpark fruits, but not crop weight. Concentrations of 50 and 100

p.p.m. reduced fruit drop of Oullins. Treated fruits of Moorpark and Oullins trees were ready for picking up to 8 days earlier than untreated fruits. Fruit quality was not affected by 2,4,5-T treatment. Some fruit cracking has occurred with advanced maturity and increased fruit size.—Fruit Res. Div., D.S.I.R.

137. SHARPE, R. H.

Effect of growth regulators on production and quality of certain nut and fruit plants.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 109-10.

Intact buds of Inca plum, which were dipped in early January with sucrose, transcinamic acid, potassium nitrate or sodium acetate showed growth on January 28 equivalent to that of March 1 on control branches. Apricot buds showed an advanced break from treatment in late December with MH or 2,4-dinitrophenol.

138. GRIGGS, W. H.

Defoliation for early pruning.

Calif. Agric., 1958, 12(9): 12, 15.

Applications of 40-50 lb. per acre of calcium cyanamide to wet leaves of William's pears during late October and early November resulted in complete defoliation after 14-17 days. No harmful effects on flowering in the following season were apparent, but it is recommended that treatments should be rotated to different blocks each year.

Composition and physiology.

(See also 8-10, 14, 71f, 157, 169a, n, 629.)

139. HULME, A. C.

Quinic and shikimic acids in fruits.

Qual. Plant. Maveg., 1958, 3/4: 468-73, bibl. 10.

Changes in contents of these acids are recorded for the peel and pulp of apples stored at 15° C. and for ripe and unripe Conference pears, Royal Sovereign strawberries and Early Rivers cherries. [See also *H.A.*, 28: 3369.]—Ditton Lab., D.S.I.R., Maidstone, Kent.

140. TAVERNIER, J.

La vitamine C dans les fruits à pépins. (Vitamin C in pome fruits.) [English and German summaries each $\frac{1}{2}$ p.]

Qual. Plant. Maveg., 1958, 3/4: 166-77, bibl. 19.

Apple varieties vary much more widely than pears in vitamin C content of the fruit. Active photosynthesis favours accumulation. Figures are given for numerous apple varieties.—Stat. Rech. pomol. cidric., Rennes.

141. PANDELE, J.

Conținutul în clorofilă al frunzelor de pomi indice biochimic pentru precizarea fenofazelor. (The chlorophyll content of leaves as a biochemical index for determining phenological stages in fruit trees.) [English, French, Russian and German summaries 1 p. each.]

Grăd. Via Liv., 1958, 7(3): 33-8 + summaries.

Seasonal changes in the chlorophyll and vitamin C content of the leaves of apple, apricot and peach varieties were studied over 5 years. Variations were great between species, less between varieties and the ratio between the chlorophyll contents of the upper and lower leaves on a branch fell markedly through the season. Chlorophyll content was at a maximum during fruit ripening and decreased suddenly at maturity. A further peak occurred in the autumn when renewed shoot growth set in. The chlorophyll content, it is suggested, could be used to determine correct dates for harvest and for fertilizer application.

142. RITTER, C. M.

The nitrogenous, carbohydrate, and mineral element composition of Stayman Winesap and Delicious apple trees growing in different soil management systems.

Diss. Abstr., 1958, 18: 747-51, bibl. 23, being *L.C. Card No. Mic.* 58-743 of 235 pp.

The N, carbohydrate and mineral element contents of mid-shoot leaves, shoot-bark and shoot-wood portions of new terminal growth, dormant twigs, 3- to 5-year-old bearing spurs, 4-year-old branches, bark from the main branches and 2-year-old roots were determined in apple trees in a 36-year-old orchard where the effects of N fertilizers on clean cultivation plus cover crops or sod-mulch plots have been studied. Soil analyses showed a greater concentration of total N, organic C, organic matter, and available B and P in the top 6-inch layer under mulch than in the corresponding layer of cultivated soil. The pH and amount of exchangeable Mg were approximately the same in soil under both systems. Total N contents were highest in new growth in the early part of the season. Nitrogen contents of leaves, spurs and new shoots decreased from mid-May, and towards the end of the season there was a tendency for N to migrate from the leaves to new terminal growth and spurs. Maximum levels of total sugars in spurs and shoots occurred at the end of May and early June coinciding with the lowest N levels. In general total sugars were higher in cultivated than in mulched plots. The greatest amounts of total carbohydrate and alcohol-insoluble materials in spurs and shoots were noted on August 20,

and at that time levels of total carbohydrate and N were higher in mulched than in cultivated plots. There were indications that mulched trees produced greater linear growth and larger, heavier leaves than cultivated trees. No consistent effects of N fertilizer on amounts of total sugars, alcohol-insoluble materials and total carbohydrates in the different tissues were observed. The seasonal trends for total P were similar to those for total N in leaves, spurs and new shoots. In general P contents of all tissues except leaves were usually greater with mulching than with cultivation. Total P of leaves was significantly greater in trees on cultivated-no N plots than in the other plots between mid-June and August 20. Total K was generally greater with mulching than with cultivation. In spurs and new terminal growth the form of the K cycles was similar to those for total N and P. In leaves and shoot bark there was a marked increase in Ca from June until the end of August, while in spurs and shoot-wood there was a decided decrease during that period. Amounts of total Ca in all tissues except 2-year-old roots were greater on cultivated plots than on mulched plots. Total Mg in leaf tissue was usually higher under cultivation than with mulching, especially toward the end of the season. In new terminal growth Mg was higher in mulched than in cultivated trees early in the season. The maximum level of Mg in leaves was noted on August 20, and the minimum on June 1, while the maximum occurred in shoots on June 20 and in spurs on May 15. Total B contents did not vary with soil treatment, except in the spurs, but in leaves and shoot portions there were generally seasonal fluctuations. It is suggested that there may be a definite relationship between total quantities of B and carbohydrates in apple trees. Amounts of total K in Stayman Winesap leaves from the cultivated-plus N and mulch-no N plots in July and August, of leaf Mg from both varieties in mulched plots on all dates, and of leaf Ca in all plots in both varieties on all dates were near or below Wallace's critical levels (1% for K and Ca, and 0.22% for Mg). Total N, P and B levels were higher in Delicious tissues than in Stayman, as also were total Mg (except in leaves) and total Ca (except in leaves and shoot-bark). Levels of total carbohydrate, total sugars and total K were approximately the same in both varieties. Reduced yields were associated with N applications in both cultivated and mulched plots, and it is suggested that the differences in yield were the result of, or were associated with, differences in the carbohydrate/nitrogen relationships of the trees in the plus- and no-N plots. It was found that positively significant correlations did exist between total and soluble fractions of K, P, Ca and Mg in apple leaves, and it is considered that these may be used in determining the nutritional status of apple trees. —Ohio St. Univ.

143. LUSIS, E.

Untersuchungen über das spezifische Gewicht bei Äpfeln und Birnen. (**Studies on the specific gravity of apples and pears.**) [Russian and English summaries 16 and 14 lines respectively.] *Arch. Gartenb.*, 1958, 6: 91-125, bibl. 25.

The specific weight and its variations in German apple varieties were determined by the hydrostatic method. In investigating 50 fruits, a range of errors of $\pm 1.6\%$ could be noted. It is suggested that the following definitions for apple varieties grown in Germany should be used: a specific weight below 0.83 = light, between 0.83 and 0.86 = medium heavy, and above 0.86 = heavy. All apple varieties examined showed a negative correlation between the absolute weight and the specific weight. The age and location do not affect specific weight in fruits of equal size. The relative intercellular volume and the specific weight of the juice are considered to be determining factors for the variations in the specific weight. The specific weight can be taken as a measure for determining the degree of ripeness, especially in the case of fruits for storing. Owing to histological and anatomical differences, pears have a substantially higher specific weight than apples, the arithmetical mean value of 0.9918 ± 0.0003 having been found. It was not possible to establish the same relations in pears as in apples. In pears the size of the fruit is of minor importance. [From author's summary.]—Inst. PflKrankh. Geisenheim, and Inst. Obstb. Gemüseb. landw. Hochsch. Hohenheim.

144. SIEGELMAN, H. W., AND HENDRICKS, S. B.

Photocontrol of anthocyanin synthesis in apple skin.

Plant Physiol., 1958, 33: 185-90, bibl. 23.

Photocontrol of anthocyanin formation in apple skin was examined. Two distinct radiation-dependent phases were found. The first phase is an induction period of about 20 hours without anthocyanin production. In the second phase anthocyanin formation is a linear function of time of irradiation at constant irradiance. The action spectra for the two phases were similar in the region of 6,000 to 7,500 Å. The action spectrum for anthocyanin formation in apple skin has a principal maximum near 6,500 Å, a subsidiary maximum near 6,000 Å and weak action throughout the visible region. The photoreceptor is probably a flavoprotein similar to acyl coenzyme A dehydrogenase. [Authors' summary.]—U.S. Dep. Agric., Beltsville, Md.

145. AZIZOV, I. M.

Qualitative changes in the oxidising system of apples during development. [Russian.]

Tr. Dagestansk. s.-h. In-ta, 1956, 9: 115-20, bibl. 12, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 93,678.

Intensity of respiration and activity of oxidising enzymes were studied in a summer, winter and late winter variety of apple, from 15–18 days after flowering to the end of storage at 3–6° C. (a total period of 4 to 13 months). The usual course of respiratory activity is described. Fruits of the late winter variety respired most intensively. At the beginning of fruit development the main respiratory enzymes were those not containing heavy metals, but during ripening an increasing role was played by the metal-containing enzymes, Fe-protein and Cu-protein. At later stages of development the activity of Fe-proteins declined and that of Cu-proteins increased, though in the late winter variety the Fe-proteins retained a high activity longer.

146. TOMASZEWSKA, E., AND TOMASZEWSKI, M. Chemiczna i biochemiczna charakterystyka owoców pigwowca chińskiego (*Chaenomeles lagenaria* Koidz.). (Chemical and biochemical properties of the fruit of Japanese quince (*Chaenomeles lagenaria*).) [English and Russian summaries $\frac{1}{2}$ p. each.] *Roczn. Nauk rol., Ser. A*, 1957, 77: 161-70, bibl. 14.

Weight, composition and enzyme activity were studied in Japanese quinces grown at the Kórník Arboretum. In 4 samples vitamin C averaged from 54.2 to 78.9 mg. %. The possibility of using the fruit for human consumption is considered.

147. PEYNAUD, E. La vitamine C dans les fruits à noyau. (Vitamin C in stone fruits.) [English and German summaries 9 lines each.] *Qual. Plant. Maveg.*, 1958, 3/4: 184-91, bibl. 8.

The range for 95 peach varieties was 6–59 mg. of ascorbic acid per 100 g. of fresh fruit pulp, individual values depending on variety and state of ripeness. The corresponding range for 84 plum varieties was 0.8–23 mg., the highest values occurring in Mirabelle varieties.—Stat. agron. oenol., Bordeaux.

Harvesting and drying.

(See also 70x, 71c, 76, 168a-c, x, 169g, 979.)

148. EL AZZOUNI, M. M., MAHMOUD, S., AND WALI, Y. Maturity index of Hood pear. [Arabic summary 1 p.] *Ann. agric. Sci. Cairo*, 1956, 1(2): 227-35, bibl. 16, illus., [received 1958].

Samples of Hood pears (considered to be a cross between a European type and the Japanese *Pyrus serotina*) were picked every 10 days; some were analysed immediately and others were kept for 10 days at room temperature before analysis.

Organoleptic tests showed that a satisfactory degree of maturity was attained in fruits picked on August 8 and 18 after 10 days storage. Fruits picked on August 28 were palatable but shrivelled in storage. It was found that the flesh of mature fruits had a firmness of 14.7 lb./sq. in. when tested with a Balluaf pressure tester. Determinations of changes in colour, size, weight, total soluble solids, titratable acids and starch were also made.—Univ. Cairo and Univ. Ain Shams, Cairo. J.R.L.

149. ADRIAN, P. A., AND FRIDLEY, R. B.

Mechanical fruit tree shaking.

Calif. Agric., 1958, 12(10): 3, 15, illus.

In studies with prune trees there were indications that boom-type shakers caused less strain on the roots, and consequently less damage, than cable-type shakers. Fruit removal was affected by frequency of shake, by length of stroke ($\frac{1}{2}$ ", 1" and $1\frac{1}{2}$ " were used), by the force required to remove the fruit divided by fruit weight (F/W), and by the number of flexible fruit bearing branches in any given tree. At low frequencies there were large differences between fruit removal at the various strokes, but at high frequencies the differences were small. Tree damage tests showed that limb breakage increased with increasing stroke, but minimum damage occurred within a frequency range of 700–900 cycles per min.

150. FRIDLEY, R. B., AND ADRIAN, P. A.

Development of prune harvester.

Calif. Agric., 1958, 12(9): 3, 11, illus.

ADRIAN, P. A., AND FRIDLEY, R. B.

Pickup machine tested.

West. Fruit Gr., 1958, 12(8): 19-20, illus.

Observations showed that a pickup machine is more economical than frame catching, requiring only about half the labour. Fruit shaken to the ground was little damaged as it fell. After preliminary tests a machine was designed in which the fruit was picked up by 2 rubber rollers, and thrown onto a crowder conveyer which lifted the fruit onto the trailer. The soil should be rolled before harvesting, and in these tests the amount of soil picked up was less than 1 lb. per box of fruit. The capacity of the machine (22 in. swath) was approximately 1 box per min., which is 5 or 6 times the rate of hand-picking.

151. MCBIRNEY, S. W.

Pallet bins and pear harvest.

West. Fruit Gr., 1958, 12(10): 14, illus.

In a comparison between pallet bin and field box harvesting, pears were hauled 5 miles to a cold storage plant, cold-stored for 6 weeks, ripened for nearly a week and examined for bruising, stem punctures and skin browning resulting from abrasion. There was little difference between the two harvesting methods as regards bruising and punctures, but pallet bin-harvested pears showed about

half as much skin browning as those harvested in field boxes. The cost of harvesting in bins was definitely lower. The study did not include emptying the bins or boxes.

152. EDDY, C. W.

Experiments on drying of fruits in the Gilgit territory.

Punjab Fruit J., 1957, 21(77): 1-5, illus.

Sulphur dioxide treatment of apricots and other fruit improved the quality of the product. Simple arrangements for a village industry are described.

Storage and marketing.

(See also 121, 168g-k, 169c, 253.)

153. MERINO, A. C.

Refrigeración y frutas. (Refrigerated storage of fruits.)

Agric. Ganad., Chile, 1957, 3(8): 2-4, 19, illus.

Necessary qualities in fruits intended for cold storage are discussed, and suitable storage temperatures, R.H. and duration are tabulated for apples, pears, plums, prunes, apricots, peaches, nectarines, sour cherries, grapes, lemons, oranges, avocados and melons.

154. STOLL, K., AND OTHERS.

Untersuchungen an Lageräpfeln. (Studies on apple storage.) [French summary 11 lines English summary 5 lines.]

Reprinted from *Mitt. Lebensm. Hyg., Bern*, 1958, 49: 172-200, bibl. 5.

Three articles are included as follows: I. The general course of maturity, and of sugar and acid contents of Boskoop and Jonathan apples in relation to various conditions of storage, by K. Stoll; II. The behaviour of vitamin B complex during storage, by V. Koehler; III. The level of vitamin C content during storage, by H. Gerber and A. Bussmann. Boskoop and Jonathan apples were stored in a cellar (6-11° C.), at 4° C. with or without CO₂, and at 0° C. Boskoop fruits stored at 0° C. showed a high rate of internal browning. The rate of saccharose inversion was higher at 4° C. than in the cellar, and in both varieties the rate of inversion was accelerated by the presence of CO₂. Contents of choline and lactoflavine increased sharply during ripening and then fell. Choline contents of both varieties were lower with CO₂ than in air storage. Vitamin C contents were relatively stable at 4° and 0° C., but dropped considerably in the cellar and at 4° C. with CO₂.—Eidg. Versuchsanst., Wädenswil, and Mikrobiol. Lab., Bern.

155. TING, S.-V.

The effect of date of harvest, subsequent methods of packing, and periods of storage on the rate of respiration and some other maturity indices of Rome Beauty apples.

Diss. Abstr., 1958, 18: 1202-4, being *Publ.* 25,450 of 180 pp.

Data from Rome Beauty orchards show that in fruits developing on the tree there was a slow increase in ground colour values, reducing sugars, and non-reducing sugars, and a decrease in total acidity, alcohol-insoluble solids and fruit firmness between 40 days (first picking) and 175 days (last picking) from full bloom. During storage at 70° F. immediately after harvest the following changes were noted: the climacteric maximum was reached sooner in late-picked than in early-picked fruits; contents of reducing sugars in early-picked fruits increased slowly for the first 2 weeks, but rose quickly for the next 2 weeks; in late-picked fruits the increase was initially fast, and became more gradual; non-reducing sugars decreased first and then increased in early-picked fruits; alcohol-insoluble solids of early-picked fruits were higher than those of late-picked fruits, but the former showed a consistent decrease, while the latter remained relatively unchanged; regardless of the concentration of total titratable acid at harvest, fruits of early and late pickings had similar concentrations after 4 weeks storage; there was a slight increase in pH readings during storage; sugar-acid ratio of the fruits showed a continuous increase in all pickings, but the ratio was much higher and the rate of increase greater in the later than in the earlier pickings. The following changes in maturity indices during longer storage were observed: respiratory activity increased with storage; early-picked fruits showed greater changes (decrease in firmness and acidity) during the early storage periods than in the later storage period; reducing sugars increased throughout the storage periods, while sucrose showed a tendency to increase first and then decrease; alcohol-insoluble solids of early pickings decreased between harvesting and the time when the fruits were first removed from storage in January, but there was no significant decrease in alcohol-insoluble solids between January and April; in late-picked fruits there was no decrease in alcohol-insoluble solids. The effect of various types of package on maturity indices during storage were small, but consistent.—Ohio St. Univ.

156. NIKITINA, K. V.

The harvesting and storage of apples. [Russian.]

Sad i Ogorod, 1958, No. 8, pp. 36-9.

The activity of volatile and liquid phytoncides of apple fruits was studied under laboratory and storage conditions. During the latter work it was found that apples from the top of the tree matured earlier and stored better than those from the lower parts. On the evidence presented it is concluded that resistance to decay of good storage varieties is due to physiological-biochemical as well as anatomical characteristics, in which the content of phytoncides is significant. Separate harvesting and storage of fruit from the upper tiers of the trees is recommended.

157. VIGOROV, L. I.

Retention of vitamins in apples during storage.
[Russian.]

Sad i Ogorod, 1958, No. 8, pp. 56-8.

At Sverdlovsk in the Urals 20 apple varieties were stored at 1° and 5° C. for 6 and 7 months. At the end of the storage periods the highest vitamin C content was found in the varieties Sport 45, Sejanec [Seedling] 71-12, Šćedraja and Ljubimec. Other varieties had a high vitamin PP but a low vitamin C content, whereas Sport 45 after 6 months' storage showed high values for both vitamin C (21.9 mg. %) and vitamin PP (22.3 mg. %).

158. BURG, S. P.

Studies on the biogenesis of ethylene.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlv.

McIntosh apples, after removal from cold storage, exhibit rising ethylene and CO₂ production for 10 hours; thereafter respiration remains constant while ethylene production maintains a 24-hour cycle. Although ethylene production stops under N, tissue slices retained under anaerobic conditions for several hours give accelerated ethylene production on return to atmospheric conditions. Considerable amounts of ethylene were produced under N after a 5-minute break of O₂. Respiratory poisons inhibit ethylene production over the same concentration range as that which affects respiration, and the inhibition can be reversed by addition of glycerol plus trace amounts of a high energy phosphate or acyl-coenzyme A source.—Harvard Univ., Cambridge, Mass.

159. L'VOV, S. D., AND KALUGINA, E. V.

Phosphorus metabolism in apples during storage. [Russian, with English summary 8 lines.]

Bot. Žurnal, 1958, 43: 757-73, bibl. 8.

The phosphorus metabolism of the pericarp and seeds was studied in 7 apple varieties. In the pericarp, during storage, the inorganic phosphate content increased continuously, indicating uninterrupted hydrolysis of organic phosphates, most probably due to respiratory disturbance caused by exhaustion of the sucrose. In the seeds the reverse took place, the content of inorganic phosphates decreased and that of organic phosphates increased. The storage quality of the different varieties was found to depend on the rate of sucrose exhaustion [see also *H.A.*, 27: 3166]. [From authors' English summary.]

160. DEWEY, D. H.

Grade defects of controlled-atmosphere apples and their effect on storage returns.

Quart. Bull. Mich. agric. Exp. Stat., 1958, 41: 122-9, bibl. 5.

Excessive quantities of substandard McIntosh and Jonathan apples were found in the controlled-

atmosphere stores examined. It was found that 44% of the fruit had been damaged in the orchard or during harvesting and handling, while only 4-8% of the fruit became defective during storage. It is suggested that growers should be more selective when putting fruit into store. J.R.L.

161. HUELIN, F. E., AND KENNETT, B. H.

Superficial scald, a functional disorder of stored apples. I.—The rôle of volatile substances.

J. Sci. Food Agric., 1958, 9: 657-66, bibl. 27.

The effect of 19 volatile products on the development of superficial scald of apples in store was investigated. At a concentration of 1 mole in 10,000 moles of air, only butyric and caproic acids and butyl and hexyl acetates significantly increased scald in oil-wrapped apples, and the level in all cases was below that of unwrapped, untreated fruit. The concentration of volatile acids, alcohols and esters in the scald-labile tissue was unaffected by storage in oil wraps. Crude "hexane" at a concentration of 1 mole in 150 moles of air gave excellent control of scald, but its effect was reduced by purification of the "hexane". The authors discuss the theory that scald is due to the accumulation of volatile substances produced by the fruit itself, the nature of the causal factor, and the mechanism of control by oil wraps.—Div. Food Res., C.S.I.R.O., Homebush, N.S.W.

162. OKAMOTO, T.

Studies on apple scald. Part I. Production of scald-like injury by various volatile substances. [Japanese, with English summary 18 lines.]

Bull. Fac. Agric. Hirosaki Univ., 1958, No. 4, pp. 47-50, bibl. 7.

Scald-like injury was produced on apples treated with low molecular weight aliphatic, such as formic and acetic, acids, n-amyl and n-hexyl alcohols, esters containing 6 to 8 carbon atoms and formaldehyde, even when these were used in very low concentrations (1 mg. % or less). J.R.L.

163. PERKINS, F. A., AND JOHNSON, R. A.

A new injury on McIntosh apples out of controlled atmosphere storage.

Maine Fm Res., 1958, 6(2): 12-13, illus.

The injury appeared to be a shipping damage which developed from abrasive action between the surface of the apple and the container walls, in combination with certain unknown factors which occurred in C/A storage. Tests showed that apples which were packed and sealed immediately after the C/A store had been opened were more susceptible to the injury than apples packed several days after the store had been opened. This points to the need for adequate ventilation of stores before apples are packed.

164. EAVES, C. A.

More tests on plastic-lined apple stores.

Grower, 1958, 50: 416-18, bibl. 1, illus.

In further tests with gas-tight plastic chambers inside cold stores [see *H.A.*, 27: 3185] good results have been obtained in a room cooled with forced air at 32° F., but with the plastic chamber heated to 39° F. In a plastic-lined store, 4 rooms were filled with McIntosh apples and kept at 39° F. with a gas concentration of 7% CO₂ and 14% O₂; this was satisfactorily maintained for 7 months. Fruit stored well, except in one room which was probably sealed before it had cooled to 39° F.—Canada Dep. Agric., Kentville, N.S.

165. KOCH, L.

Kertészeti termények gázkezelése, a szállítási és tárolási veszteségek csökkentésére. (**Gas treatment of horticultural produce against storage and transport losses.**) [Russian and English summaries 9 lines each.]

Kert. Kut. Int. Évk., 1957, 2: 349-59, bibl. 21.

Fumigation with 4-20 g./cu.m. formaldehyde reduced fungal infection in peaches, apricots, plums, grapes and sour cherries by 58-88% during 5-7 days' storage or transport. Refrigerated storage and transport prolonged the effect of fumigation. The treatment did not damage the fruit.

166. MCCLURE, T. T.

Brown and Rhizopus rots of peaches as affected by hydrocooling, fungicides and temperature.

Phytopathology, 1958, 48: 322-3, bibl. 8.

MCCLURE, T. T., AND SMITH, W. L., JR.

Effect of holding temperatures on brown and Rhizopus rots of hydrocooled peaches.

Abstr. in *Phytopathology*, 1958, 48: 462.

Peaches inoculated with *Rhizopus stolonifer* (the Rhizopus rot fungus) or *Monilinia fructicola* (the brown rot fungus) were hydrocooled in water or in a 0.1% Dowicide A solution, held 3 days at 40°, 45°, 50°, 55° or 60° F., and then placed at 75° for 3 more days. Dowicide A significantly reduced the amounts of both rots. The effectiveness of Dowicide A when the holding temperature was 60° was about half that when the holding temperature was 40°. The amounts of brown and Rhizopus rots that developed in all lots of peaches varied with the holding temperature and increased significantly in lots treated with Dowicide A when holding temperatures were greater than 50°. Holding temperatures above 40° significantly increased brown rot, and those above 45° significantly increased Rhizopus rot in lots hydrocooled in water.

167. SMITH, W. L., JR., AND MCCLURE, T. T.

Rhizopus decay of peaches as affected by post-harvest temperatures and moisture conditions.

Abstr. in *Phytopathology*, 1958, 48: 464.

Some peaches were wounded, inoculated immediately with *Rhizopus stolonifer*, and held 1-5 days at 32° or 40° F.; other wounded peaches were held 1-5 days at 32° or 40° or 1 day at 75° before inoculation. Samples were kept at these temperatures in open containers or in perforated polyethylene bags with or without wet cotton over the wounds. They were then subsequently held uncovered at 75°, along with check fruit inoculated immediately after wounding, and held continuously at 75°. Peaches inoculated immediately and held at 32° or 40° before placement at 75° decayed less than those held continuously at 75°. Those held 3 or 5 days at the low temperatures decayed less than those held 1 day. Wounded peaches held uncovered 1-5 days before inoculation decayed less than similar ones in polyethylene, and less than those inoculated immediately after wounding and held at low temperatures before placement at 75°. Temperature between wounding and inoculation had little effect on decay. Peaches with cotton-covered wounds decayed almost as much as check fruit. Low temperatures presumably lessen decay by drying wounds rather than by affecting the virulence of *Rhizopus*.

Noted.

168.

a ANON.

Forecasting peach maturity in Colorado.

Agric. Mktg., 1958, 3(8): 7.

A method has been developed based on daily maximum temperatures prior to July 1, with adjustments for earliness of bloom and cool days.

b ANON.

Semi-automatic packer for British apples.

Comm. Gr., 1958, No. 3276, p. 749, illus.

The American apple float packer is described. One operator can pack 80 bu. per hr.

c BERE, R. L.

An economic analysis of the grading, packaging, and marketing of apples, with special reference to prepackaged apples.

Diss. Abstr., 1958, 19: 199, being *L.C. Card No. Mic 58-2621* of 36 pp.

Costs in Ohio.

d VAN DER BOON, J.

Bespuiting met stikstofmeststoffen in de fruitteelt, in het bijzonder met ureum. (**Spraying fruit crops with nitrogenous fertilizers, in particular urea.**)

Reprint from *Landbouwdocumentatie*, 1958, 14: 1107-10, 1112-16, bibl. 40.

A literature review.

- e BOS, J.
Mulching in fruit growing.
Stikstof, 1958, No. 2, pp. 49-59, bibl. 3, illus.
Advantages, disadvantages, and materials (including grassing down).
- f [CEGŁOWSKI, M.]
Appleland's foreign friend.
West. Fruit Gr., 1958, 12(10): 13.
Polish winter-hardy framework apple varieties.
- g DALRYMPLE, D. G.
Automatic fruit vending.
[Publ.] *Cornell Univ. agric. Exp. Stat.* A.E. 1008, 1955, pp. 44, bibl. 30, illus., [received 1958].
Types of machine available in America are described.
- h DALRYMPLE, D. G.
Merchandising prepackaged apples.
[Publ.] *Dep. agric. Econ., Cornell Univ. agric. Exp. Stat.* A.E. 1027, 1956, pp. 5, [received 1958].
5-pound bags sold better than 3-pound bags.
- i DALRYMPLE, D. G. [AND BLANPIED, G. D.].
Marketing controlled-atmosphere apples.
[Publ.] *Dep. agric. Econ., Cornell Univ. agric. Exp. Stat.* A.E. 1028, 1956, pp. 59, bibl. 22, [received 1958].
- j DALRYMPLE, D. G.
Farmers roadside marketing associations.
[Publ.] *Ext. Serv., Coll. Agric., Univ. Conn.*, Oct. 1957, pp. 28.
On apple marketing.
- k DALRYMPLE, D. G.
Factors affecting variations in apple prices.
[Publ.] *Dep. agric. Econ., Univ. Conn.*, 1958, pp. 10, bibl. 4, mimeo.
Year-to-year, seasonal and monthly variations and how storage should be arranged in consequence.
- l DOBRESCU, V.
Observatii și recomandări în legătură cu pomicultura din stepa Dobrogeană. (Some observations and recommendations on fruit growing in the Dobruja steppe.) [English, French, Russian and German summaries $\frac{3}{4}$ p. each.]
Grăd. Via Liv., 1958, 7(5): 35-9 + summaries.
Expansion of fruit growing in this drought area, with stone fruits, particularly apricots, predominating.
- m DOSTÁLEK, J.
Příspěvek k poznání našich místních višní (*Prunus cerasus* L.). (Studies on local sour cherries in Czechoslovakia.) [English and Russian summaries $\frac{1}{4}$ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 37-46, bibl. 13, illus.
A description of 9 sour cherries of which 3, Kystanka, Rokytnická and Šakvická, are recommended.
- n FIORITO, G.
Le peroche napoletane. (Neapolitan Percoca peaches.)
Ital. agric., 1958, 95: 489-92, illus.
Yellow clingstone types of choice flavour, used mainly for canning and jam making.
- o FRANKEN, E.
Über die Häufigkeit des Auftretens windstarker Wetterlagen unter besonderer Beachtung der Verhältnisse an der Niederelbe. (On the frequency of high winds occurring in orchards, with special reference to the conditions of the Lower Elbe.)
Mitt. ObstbVersuchsrings Jork, 1958, 13: 219-23, bibl. 1.
- p GALEY, R.
La culture des pommiers en haie fruitière. (Growing apple trees as fruiting hedges.)
Fruits et Prim., 1958, 28: 90-1.
Training methods described.
- q GARNER, R. J.
Propagation of woody plants by cuttings.
J. roy. hort. Soc., 1958, 83: 335-43, bibl. 14, illus.
A review of recent work and its application to apple rootstocks.
- r GILBERT, E. G.
Model fruit gardens at Wisley.
J. roy. hort. Soc., 1958, 83: 430-8, bibl. 2, illus.
The layout (with plans), treatment and performance of 3 model fruit gardens planted in 1947.
- s INSTITUUT VOOR'DE VEREDELING VAN TUINBOUWGEWASSEN.
9^e beschrijvende rassenlijst voor fruitgewassen 1958. (Ninth descriptive variety list of fruit crops, 1958.)
[Publ.] *Inst. Vered. Tuinbouwgewass., Wageningen*, 1958, pp. 128, illus., fl. 2.
- t KARNATZ, H.
Vergleichende Untersuchungen über die Frosthärte der Kirschunterlagen von Bremen und F 12/1. (Comparative trials on the frost resistance of the cherry rootstocks von Bremen and F 12/1.)
Mitt. ObstbVersuchsrings Jork, 1958, 13: 223-5, bibl. 1.
In trials with a mobile freezing chamber F 12/1 proved slightly hardier than the seedling.

- u KENT EDUCATION COMMITTEE.
Fruit plots for secondary schools.
[Publ.] *Kent Educ. Cttee*, Springfield, Maidstone, [1958], pp. 19, 2s.
A guide to teachers, with plans of demonstration plots.
- v KILPATRICK, D. T.
Re-working apple and pear trees.
J. Dep. Agric. S. Aust., 1958, **62**: 14-20, illus.
Well illustrated instructions on top, side or frame, and crown grafting.
- w KRIJGSMAN, H. K.
Arbeidsonderzoek in de tuinbouw. (**Work study in horticulture.**) [English summary 6 lines.]
Meded. Dir. Tuinb., 1958, **21**: 434-8, illus.
Comparison of fruit picking methods.
- x KRIJGSMAN, H. K., AND DE RUITER, J.
Verhoging van de plukprestaties. (**Increasing the rate of picking [top fruit].**)
Fruitteelt, 1958, **48**: 892-3, illus.
Capital and running costs of American iron monkey are considered too high.
- y LAMBORN, E. W.
Apple production costs and returns: selected Utah areas, 1955.
Bull. Utah agric. Exp. Stat. **403**, 1957, pp. 20.
- z (LANTZ, H. L.).
New apple variety, Jonadel, released.
Ia Fm Sci., 1958, **13**: 70, illus.
A cross of Jonathan and Delicious described.
- Noted.
169. a LI, K. C., AND WAGENKNECHT, A. C.
A minor anthocyanin pigment of sweet cherry.
Nature, 1958, **182**: 657, bibl. 6.
Chrysanthemin occurs in the fruit.—Cornell Univ.
- b VAN MARLE, G. S.
Ervaringen met groeistoffen ter verbetering van de kleur van de vruchten. (**Experiments with hormones to improve fruit colour.**)
Fruitteelt, 1958, **48**: 816-17, illus.
With Glorie van Holland and James Grieve.
- c MEYER, C. H.
Comparative costs of handling apples at packing and storage plants.
Mktg Res. Rep. U.S. Dep. Agric., **215**, 1958, pp. 75, illus.
- d PASQUIER, J.
Diagnostic foliaire et fumure des arbres fruitiers. (**Foliar diagnosis and the manuring of fruit trees.**)
Tunis. agric., 1958, **59**: 79-88.
A review, including data on fertilizer status of Tunisian fruit trees.
- e PÉNZES, A.
Prunusok csonthéj (putamen) anatómiája. (**The anatomy of the stone (putamen) in some species of Prunus.**) [Russian and German summaries $\frac{1}{2}$ p. each.]
Kert. Kut. Int. Évk., 1957, **2**: 249-59, bibl. 1, illus.
An examination of the cell structure of the endocarp in 11 species and several varieties of *P. domestica*.
- f REMY, P.
La pollinisation dans les vergers commerciaux. (**Pollination in commercial orchards.**)
Fruits et Prim., 1958, **28**: 92-3.
The causes of poor fruit set and the pollination behaviour of Red Delicious and related varieties.
- g STOLL, K.
Zur Bestimmung des Pflückzeitpunktes der Apfelsorte Jonathan. (**On determining the date for picking Jonathan apples.**)
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 455-8.
With a colour chart.
- h TAGER, J. M.
Isolation of active mitochondria from apples.
Nature, 1958, **182**: 1521-2, bibl. 6.
- i VAHITOV, M. Š.
A machine for the extraction of seeds from apples. [Russian.]
Sad i Ogorod, 1958, No. 8, pp. 59-60, illus.
Extracts seeds [for rootstock production] at 6 times the manual rate.
- j VÁVRA, M.
Možnost použití historických metod při studiu ovocnářské ekologie. (**The possibility of using historical methods for ecological studies in fruit growing.**) [Russian and English summaries 11 lines each.]
Acta Univ. Agric. Silv. Brno, Ser. A., 1957, No. 2, pp. 183-92, maps.
Choosing fruit species for specific areas on the basis of detailed censuses.
- k DE VILMORIN, R. L.
Shaped fruit trees.
J. roy. hort. Soc., 1958, **83**: 419-21, illus.
With instructions for training apple or pear as a 4-branched "Palmette Verrier".
- l WALKER, W. F.
The extent of local variety improvements in the Tasmanian apple industry.
Tasm. J. Agric., 1958, **29**: 222-5, bibl. 6.
Local varieties and selections now constitute 32% of the total.

m WELKERLING, E. M. L.

La bibliografía pomológica europea en los siglos XVII, XVIII y XIX. (*Bibliography of pomology in Europe in the 17th, 18th and 19th centuries.*)

Idia, 1958, No. 124, pp. 8-34, illus.

n WILLIAMS, A. H.

A *p*-coumaryl-quinic acid from apple fruit.

Chem. Ind. Lond., 1958, No. 37, p. 1200, bibl. 2.

Isolated from fruitlets of a cider variety.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 6, 9, 10, 217b, d, e, g, i, j, l, m, o, 381, 401, 683, 973, 1002.)

170. MOUAT, H. M.

New Zealand varieties of yang-tao or Chinese gooseberry.

N.Z. J. Agric., 1958, 97: 161-5, illus.

Descriptions of flowers and fruits of Abbott (syn. Green's), Allison (Large Fruited), Bruno (Long Fruited and Te Puke) and Hayward (Giant, McWhannels and Hooper's Giant) varieties of *Actinidia sinensis*. [For a preliminary note on types see *H.A.*, 28: 3458a.]

171. RAKE, B. A.

The classification of gooseberries: I. Useful characters for the classification and identification of varieties.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 60-5, illus.

Characters, examined during the winter (bush and shoot), at blossom time (flowers and young leaves) and during the summer (foliage, young shoots and fruits) are described in some detail, and the usefulness of each of them for purposes of classification and identification is discussed.

172. RAKE, B. A.

The propagation of gooseberries: VI. The influence of source on the rooting of hardwood cuttings.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 59-60, bibl. 2.

With the varieties Leveller and Keepsake cuttings obtained from 8-year-old fruiting bushes and from stool bushes that were cut back to ground level each year showed a significantly higher rooting percentage and also made better subsequent growth than cuttings taken from 2-year-old bushes. By contrast, with the variety Careless cuttings from the 2-year-old bushes rooted and grew as well as those from the other sources. [For Part V see *H.A.*, 28: 186.]

173. ANON.

Huckleberries are a money maker.

Comm. Gr., 1958, No. 3277, p. 793, illus.

Three-quarters of an acre of huckleberries (*Solanum nigrum guineense*) have been successfully grown in

Essex. The annual plants were sown in a cold frame in March, or *in situ* in mid-April. Plants were spaced 17 in. square, with a 2-foot space between each double row. The average yield was 6 lb. per plant.

174. HOBBS, E. W., AND CAMPBELL, A. I.

Leaf-bud propagation of a virus-tested loganberry clone.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 65-8, bibl. 4, illus.

In 1956 leaf-bud cuttings from 5 plants of a loganberry clone, that was true to type and virus-tested, gave rise to 210 plants. In 1957 24 plants, including the original 5, were used as stock plants, and over 800 new plants were raised from them. Experience in these two seasons suggests, among other things, that (1) July and August are the best months for taking leaf-bud cuttings; (2) only leaf-buds from the central section of a cane (about 50-60% of the total) root satisfactorily; (3) rooting is reduced if part of a leaf is removed or damaged; (4) the segments of cane should not be cut too thin, in fact the presence of some pith is not detrimental; (5) a rooting medium of equal parts of sterilized loam, peat and grit is satisfactory; (6) the first few days after the cuttings are set are critical, the most important factor at this stage being shade.

175. PRATT, C., EINSET, J., AND CLAUSEN, R. T.

Embryology, breeding behaviour and morphological characteristics of apomictic, triploid *Rubus idaeus* L.

Bull. Torrey bot. Cl., 1958, 85: 242-54, bibl. 23, illus.

A triploid red raspberry, growing wild at Ithaca, New York, is intermediate in its gross morphology between *Rubus idaeus* subsp. *idaeus*, as represented by the autotetraploid variety Hailsham, and *R. idaeus* subsp. *strigosus*, as illustrated in wild plants of central New York. Aposporous and reduced embryo sacs were found and pseudogamy demonstrated in breeding experiments. The chromosome numbers of the offspring suggest that unreduced eggs functioned parthenogenetically (in 78-92% of the seedling populations) or following fertilization. Reduced eggs of various chromosome numbers functioned after fertilization and possibly parthenogenetically. [Authors' summary.] —N.Y. St. agric. Exp. Stat. and Cornell Univ.

176. WIERSZYŹŁOWSKI, J., AND OTHERS.

Wartość produkcyjna i technologiczna 10 odmian malin w początkowym okresie owocowania plantacji. (The productivity and processing value of 10 raspberry varieties in the early stages of bearing.) [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1957, 77: 131-59, bibl. 20.

In replicated variety trials at Poznań, during the second year of fruiting, Rubin gave the highest yield, averaging 5,596 kg. ha. and was followed by Lloyd George, Mallings Exploit, Mallings Seedling Z and Souvenir de Paul Camenzind. When the suitability of the varieties for 5 kinds of processing was tested the following were found to be the best: Souvenir de Paul Camenzind, Lloyd George and Mallings Exploit.

177. GASTON, H. P., LEVIN, J. H., AND HEDDEN, S.
A detachable lug carrier for harvesting raspberries to be processed.

Quart. Bull. Mich. agric. Exp. Stat., 1958, 41: 116-21, bibl. 1, illus.

A carrier consisting of a $\frac{1}{2}$ -in. iron rod framework, into which a wooden lug holding 13 $\frac{1}{4}$ lb. fruit can be fitted, has been designed. The carrier holds the lug 10 in. off the ground and facilitates picking and handling the fruit in the field and at the check-in station. Costs are reduced since the boxes used in the carrier are those in which the fruit is transported to the processing plant. It was found not suitable for use when picking fruit for the fresh fruit market. J.R.L.

178. BROOKS, A. N.

Strawberry Investigations Laboratory.

A.R. Fla agric. Exp. Stats, 1956-57, p. 381-3.

Breeding. New strawberry varieties for Florida are being produced, and parent varieties are being tested. **Weed control.** Applications of 2-chloro-4-ethylamino-6-diethylamino-symtriazine (50% wettable powder) was applied on December 6 at a rate of 1.5 lb. active ingredient per acre. Weeds of not more than 1 $\frac{1}{2}$ in. were killed, but leaves of larger weeds were only spotted. The area remained free of weeds for approximately 8 weeks, but there was some leaf yellowing of the strawberry plants. Vapam injected into the soil before planting reduced the amount of hoeing and hand-weeding required up to the end of June. Weed control by ethyl N, N-di-n-propylthiocarbamate was poor, and some plant injury was observed. Many weeds have been eliminated over a period of several years by sowing velvet beans as a summer cover crop. **Hot water treatment.** Runners from Missionary and Florida Ninety strawberries after hot water treatment showed no difference in yield from untreated runners. Hot water treatment was ineffective in freeing strawberry plants from virus, but gave good nematode control.

179. DARROW, G. M., AND SCOTT, D. H.

Strawberry varieties in the United States.

Fmrs' Bull. U.S. Dep. Agric. 1043, revised 1958, pp. 20, illus.

Among matters discussed in this bulletin are the differences between varieties in their response to climate (notably the factors of day-length and temperature), in their soil and moisture requirements, in their growth and fruiting habits, and in their resistance to diseases. Short descriptions are given of many varieties, both established and new, and 34 of them are listed with data on their resistance to fungus and virus diseases, their season of cropping and the quality of their fruit both when fresh and frozen.

180. BOGDANSKI, K. A.

Teneur en vitamine C de 26 variétés de fraises. (Vitamin C content of 26 strawberry varieties.) [English and German summaries $\frac{2}{3}$ p. each.]

Qual. Plant. Maveg., 1958, 34: 210-26, bibl. 11.

Among strawberry varieties grown in Poland, high vitamin C values, averaging 90 or more mg. per 100 g. of fresh fruit, were found in Purpuratka, Afryka and Laxton Noble, in descending order. There was considerable variation with locality in all varieties, in spite of identical manuring. Vitamin C contents were determined in 17 varieties after 3 and 6 months' refrigeration of the fruit in syrup. Losses were slight in Krolowa Luiza, Afryka, Ville de Paris and Cambridge, but very considerable in Royal Sovereign and Idun. Passage of the vitamin from the fruit into the syrup before freezing was very slow at 20° C., but rapid at 45° C. Losses due to this transference continued during cold storage, but were increased far more markedly by slow thawing than by prolonged storage.—Inst. Pomol., Skierniewice, Poland.

181. RISSO PATRÓN, R.

Valor vitaminico C de la frutilla. (Vitamin C content of strawberries.)

Rev. argent. Agron., 1958, 25: 54-6.

Quantitative data are recorded for vitamin C content of strawberries harvested in Argentina, at 7 stages of ripeness to over-ripeness, on each of 7 dates from mid October to late December. Values were highest immediately before and during full ripeness, and during early November. Green fruits averaged 54.07 and fully ripe ones 108.49 mg. per 100 g. over the 10-week period. The early-November value for ripe fruits was 120.3 mg. per 100 g.

182. ZYCH, C. C.

A study of the influence of beta-naphthoxyacetic acid and soil moisture upon the yield, berry weight and chemical composition of strawberry fruits (*Fragaria* sp.).

Diss. Abstr., 1958, 18: 359, being *Publ.* 25,316 of 116 pp.

Two and 3 drench sprays of β -naphthoxyacetic acid (NOA) at 50 and 100 p.p.m. were applied to Howard 17 (Premier) and Vermilion strawberries during flowering and fruit development in the field. Total yields of both varieties were significantly increased by 50 p.p.m. NOA and significantly decreased by 100 p.p.m. Average berry weight was usually increased by 50 p.p.m. and decreased by 100 p.p.m. Spray applications of NOA did not significantly alter the concentrations of the chemical constituents determined. Six drench sprays of NOA (4 at 50 p.p.m., followed by 2 at 100 p.p.m.) were applied to Tennessee Shipper strawberries in the greenhouse at 2-day intervals, from 12 days after anthesis of the first flowers. High and low moisture treatments were included in a factorial design. No significant differences resulting from NOA treatment were found for fruit-size increment, weight of measured berries at maturity, weight of mature and immature fruit, or number of days to maturity. Fruit from high-moisture treatments showed a greater fruit-size increment and weighed more at maturity than those from low-moisture treatments. The total weight of all fruit obtained from each plant was also greater from high-moisture treatments.—Univ. Illinois.

183. STOITSCHKOV, J. P.

Regeneration der Achsen und Periodizität der Blütenbildung bei den einmaltragenden Erdbeersorten. (**Axis regeneration and periodicity of flower formation in strawberry varieties.**) [English, French and Spanish summaries 12-16 lines each.]

Mitt. Klosterneuburg, Ser. B, 1958, 8: 207-13.

Observations have enabled the 6 varieties studied to be divided into 2 groups. The first group (Mme. Moutôt, Mieke Schindler and Eva Macherauch) differed from the second group (St. Josef, Königin Luise and Sharpless) as follows: more axes of a higher order were formed; the plants entered dormancy earlier and broke dormancy later, thus avoiding cold injury; yields were higher. With all varieties a decrease in axis regeneration with advancing age coincided with decreased yields.

184. BURMISTROV, A. D.

The effect of methods of planting on strawberry yields. [Russian.]

Sad i Ogorod, 1958, No. 9, pp. 60-2.

In Latvia on well fertilized soil with pH 6 to 6.2, 5 strawberry varieties were planted in August by 5 different methods, with plant densities varying from 27,556 to 62,500 plants per ha. The best winter survival resulted from planting 20 cm. apart in rows 80 cm. apart, i.e. 62,500 plants per ha. Over a 3-year period the highest yields were obtained from this closest planting system and by planting 8 plants in squares of 40×40 cm. with a distance of 120 cm. between the centres of the

squares, i.e. 55,112 plants per ha. The highest yields were produced by the variety Komsomolka and the lowest by the old standard variety Koralka.

185. JAHN, O. L., AND CROSBY, E. A.

Growth of the strawberry plant as affected by several nitrogen carriers.

Proc. Amer. Soc. hort. Sci., 1958, 71: 207-15, bibl. 23.

In greenhouse experiments Sparkle strawberry plants receiving ammonium nitrate (33% N), sodium nitrate (16% N) or urea (45% N) produced significantly greater leaf areas, runner growth and plant weight than did control plants or those receiving Uramite (urea-formaldehyde resin, 39% N) or Pitorganite (sewage sludge, 6% N). The main effect of treatment on total leaf area was on leaf size rather than number; differences in runner growth were a result of differences in numbers produced, rather than growth rates of individual runners.—Rutgers Univ., New Brunswick, N.J.

186. AZIMOV, R. A.

A study of the effect of microelements on the distribution of sugars in *Fragaria* using paper chromatography. [Russian.]

Bot. Zhurnal, 1958, 43: 831-6, bibl. 30, illus.

Boric acid, zinc sulphide, potassium permanganate, copper sulphate, ammonium molybdate and some of them in combination were sprayed on the strawberry variety Novinka [Novelty] during bud formation and flowering. Different carbohydrates were found in the vegetative and reproductive organs. The leaf blade, petiole and green fruits before ripening contained saccharose, glucose, fructose, maltose, xylose and in some cases arabinose, whereas at the beginning of formation and during full maturity the fruit contained only the first three. Microelements increased the total sugars in the leaf blade and intensified their translocation. At the beginning of fruit development all microelements, except Mo, intensified the polymerization of incoming sugars and in addition Zn, Mn, B and B+Zn prolonged active synthesis. Delay in the onset of hydrolysis led to a greater accumulation of high molecular carbohydrates, the hydrolysis of which gives soluble forms and thereby improves the quality of the fruit. On the other hand Cu and Mo hastened the onset of hydrolysis.—Komarov bot. Inst., Leningrad.

187. BOULD, C.

Soil conditioners: II. The effect of HPAN and VAMA on the yield of strawberries.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 71-6, bibl. 2.

Three experiments are described. In two of them, carried out at Long Ashton using the variety Climax, either HPAN or VAMA were incorporated

in the top 3 in. of soil at a rate of 0.1%, with and without NPK. In the third trial, at the N.A.A.S. Station at Efford, the variety was Royal Sovereign, and VAMA was incorporated in the top 6 in. of soil at 0.05%, with and without F.Y.M. and NPK; other treatments prior to planting were a fallow and a grass ley ploughed in. Both soil conditioners had beneficial effects on soil structure and aggregate stability, but neither enhanced the yield of fruit, either in the presence or absence of NPK fertilizers or of F.Y.M.

188. SIMONS, R. K.

Response of Howard Premier and Vermilion varieties of strawberries to supplemental irrigation.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 216-23, bibl. 10, illus.

Supplemental irrigation applied during fruit set and early development significantly increased fruit yields in 2 seasons. Size was not significantly affected by irrigation, but more berries were produced in irrigated than in non-irrigated plots. The response of Vermilion to irrigation was greater than that of Howard.—Univ. Ill., Urbana.

Vines.

(See also 217a, c, f, h, n, p, 969.)

189. ROSSI, F. J.

An investigation into the vine industry of Cyprus.

[*Publ.*] *Cyprus Govt.*, Nicosia, 1956, pp. 24, 100 mils. [Received 1958.]

Included in numerous recommendations for the rehabilitation of the industry is the replanting of the vine areas with improved material which should be selected after trial of imported new varieties and phylloxera-resistant American rootstocks. The report also recommends the establishment of a Vine Institute and numerous measures to promote advertisement, sales, and control of standards and prices.

190. LEYVRAZ, H.

Sélection de la vigne et choix des sarments à greffons. (Vine selection and the choice of scion shoots.)

Rev. romande Agric. Vitic., 1958, **14**: 69-73, bibl. 1, illus.

Three methods of vine selection are discussed, namely clonal selection, mass selection and selection by elimination of the poorest vines. The last two are suitable for growers and nurserymen, but long-term clonal selection is for the specialist. The results of clonal selection of Chasselas fendant roux by the State experimental stations are summarized.

191. BALTAGI, B.

Incercări comparative de altoire între principalele soiuri de vițe roditoare și portaltui din podgoria Tîrnavele. (Comparative trials on grafting some important vine varieties on different rootstocks in the vineyards of Tîrnavele.) [Russian and French summaries $\frac{3}{4}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), **24** (5): 487-501, bibl. 7.

All combinations of 10 varieties and 9 rootstocks were tried. Of the rootstocks Berlandieri $\times$ Riparia selection Crăciunel 2 proved the most satisfactory as regards minimum loss of grafts (14.11%), largest number of plants with well developed root systems (58.46%), good graft union (49.94%) and first quality transplants (44.3%).

192. RIBAS, W. C., AND CONAGIN, A.

Variedades de cavalos de videira e sua melhor época de enraizamento. (Vine rootstock varieties and the best time for rooting them.) [English summary $\frac{1}{4}$ p.]

Bragantia, 1957, **16**: 127-38, bibl. 8.

The varieties tested were (1) Rupestris du Lot, (2) Riparia $\times$ Rupestris 101-14, (3) Golia, (4) Kober 5BB, (5) Mourvèdre $\times$ Rupestris 1202, and (6) Aramon $\times$ Rupestris Ganzin No. 1. Rooting trials were made in the middle of each month from May to October inclusive, under field conditions in São Paulo State, Brazil. The average rooting percentage decreased from 79.1 to 44.8 in the order: June, July, August, September, May, October. The best results for varieties 2 and 5 were obtained in August, and for all 4 others in June.

193. BANIȚĂ, P., AND BALTAGI, B.

Contribuiți la stabilirea celor mai bune condiții de altoire și forțare la vița de vie. (Determining the conditions for grafting and forcing vines.) [Russian and French summaries 1 p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), **24** (5): 503-19, bibl. 15, illus.

During 3 years work the best results were obtained when rootstock cuttings were 8-9 mm. in diameter and the scion the same size or slightly smaller. The highest percentage of first quality grafted plants was produced by cuttings from the middle section of the shoot, followed by those taken from the base. The optimum forcing temperature was 25° C.

194. BANIȚĂ, P.

Un nou procedeu de forțare a vițelor în sera, după metoda Mișurenko. (A new method of forcing grafted vines in the greenhouse.) [English, French, Russian and German summaries 1 p. each.]

Grăd. Via. Liv., 1958, **7** (5): 26-9+summaries.

Mišurenko's method [see *H.A.*, 22: 2247], in which the union of scion and rootstock is kept at 26–28° C. and the base of the rootstock at 6–10° C., produced a much higher percentage of planting material than the usual method of forcing vine grafts at an overall temperature of 24–25° C.

195. BLAHA, J.

Diagnostika vyzrálости réví röntgenem. (**Determination of maturity in vine wood by X-rays.**) [English, Russian and German summaries $\frac{1}{2}$ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 65-8, bibl. 2, illus.

The determination of the wood:pith ratio in propagating material by radiographs proved practicable but, for large-scale application of the method, the construction of an improved mobile apparatus is necessary.

196. TUKEY, L. D.

Effects of controlled temperatures following bloom on berry development of the Concord grape (*Vitis labrusca*).

Proc. Amer. Soc. hort. Sci., 1958, 71: 157-66, bibl. 6, illus.

Increases in night temperatures during the 10–13 day period after flowering resulted in increased rates of berry growth. Optimum night temperatures were highest during the first 3 days after flowering, after which they gradually became lower. Immediately after flowering maximum berry growth occurred at night temperatures above average day temperatures, but finally optimum night temperatures were lower than average day temperatures. Optimum day temperatures ranged from 79–9° F. to 84–9° F. Berries making the greatest total growth during the 13 days after flowering grew on vines exposed to diurnal temperatures averaging 82° F. in 1955 and 79° F. in 1956. In 1956 the largest berries at harvest were those which had developed at 79° F. during the 13-day post-flowering period, and these berries had the greatest number of seeds per berry, the greatest berry weight and the highest percentage of soluble solids. —Pa St. Univ., University Park.

197. NEŠČERETNJAJA, L. I.

On the depth of planting vines. [Russian.] *Sad i Ogorod*, 1958, No. 9, pp. 73-4.

Under the conditions of the trials described, planting vines 60 cm. deep resulted in a better root system and higher yields than planting either 40 or 80 cm. deep.

198. CAPUCCI, C., AND OTHERS.

L'immersione dei pali di alcune essenze legnose in soluzioni di solfato di rame. (**Immersion of vine poles of various wood types in solutions of copper sulphate.**)

Riv. Vitic. Enol., 1958, 11: 178-86, 218-24, 239-45, bibl. 12, illus.

Data are recorded for penetration of copper sulphate solutions into poles of poplar, willow, chestnut and *Robinia* during immersion of their bases for different periods in copper sulphate solutions ranging from 2% to 10%. Absorption was good in freshly cut, but poor in stored, poles. Chestnut, and particularly *Robinia*, absorbed the solutions well when the bark was left on, but when this was removed the highest absorption was found in willow. The speed of penetration and the total amount absorbed increased with increasing concentration of the solution.

199. TÎCAN, I.

Stabilirea epocii optime pentru dezgropatul viilor roditoare în podgoria Tîrnave. (**The optimum date for uncovering vines in the Tîrnave vineyards.**) [Russian and French summaries $\frac{1}{2}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24 (5): 533-7, bibl. 7.

The best time for uncovering vines was found to be just after the first thaw when there is no more risk of a drop in temperature below –10° C. [+12° F.]. The advantages of relatively early uncovering included reduced loss of buds, in the mounds and after uncovering, retarded bud burst and better spacing of vineyard work.

200. MOȚOC, M., AND OTHERS.

Contribuții la stabilirea agrotehnicii anti-erozionale în planșatiile de vii. (**Anti-erosion measures in vineyards.**) [Russian and French summaries $\frac{1}{2}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24 (5): 147-68, bibl. 4.

As a result of contour cultivation and building banks 15–25 cm. high along the rows erosion has been practically eliminated in Roumanian vineyards with a 8–39% increase in yield.

201. GRECU, I.

Efectul îngrășămîntului verde asupra creșterii și productivității viței de vie în podgoria Odobești. (**The effect of green manures on the growth and yield of vines in the Odobești region.**) [English, French, Russian and German summaries 1 p. each.] *Grăd. Via Liv.*, 1958, 7 (3): 10-15+summaries.

In a vineyard planted with Italian Riesling on Riparia × Rupestris 101–14 the following green manure crops were used: *Vigna sinensis*, a legume and cereal mixture, and *Lupinus luteus*. The crops were sown in alternate interrows in early spring, the other interrows being clean cultivated, and were ploughed in to a depth of 20–25 cm. 10 days before the flowering of the vines. After 3 years all treatments had improved soil structure and its nutrient status. Compared with the controls, the vegetative growth of the vines increased by 32%, fruit set by 15% and yield by 19%.

202. BUŠIN, P. M.

Deep ploughing combined with fertilizer application on irrigated vineyards in Uzbekistan. [Russian.]

Vinodelie i Vinogradarstvo, 1958, 18 (7): 27-9, illus.

Deep ploughing (45–50 cm.) combined with NPK application produced 31.8% higher yields than deep ploughing without fertilizers, and 19.3% higher than shallow ploughing-in of fertilizers. The effect of treatments on the nutrient status of the soil and on root development is discussed.

203. ALEXANDRESCU, I.

Cercetări cu privire la folosirea gunoiului de grajd la vița de vie în podgoria Murfatlar. (The use of farmyard manure on vineyards in Murfatlar.) [Russian and French summaries $\frac{3}{4}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24 (5): 521-32, bibl. 8.

FYM was best applied in the autumn, after covering the vines, at a rate of 60 t./ha. trenched in to a depth of 35–45 cm. The treatment increased soil moisture, vegetative growth and yield without affecting quality. The yield increase for 4 years (1951–1954) averaged 50%.

204. KIMBALL, K., AND SHAULIS, N.

Pruning effects on the growth, yield, and maturity of Concord grapes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 167-76, bibl. 10.

In the lightest pruning treatment, i.e. 65+10 (65 buds left on the vines for the first pound of prunings, plus 10 buds for each additional pound of prunings), vine growth was maintained and yields averaged 10.3 tons per acre during the 5-year trials. Yields from the heaviest pruning treatment, i.e. 20+10, were 7.4 tons per acre, but soluble solids were 1% higher than in fruit from the lightest pruning. Severe pruning in contrast to light pruning resulted in decreased bud number, but increased shoot number per bud and berry number per cluster. Delayed maturity of the large crops on vigorous vines is considered to be a result of inadequate exposure of the large leaf surface. Reduced leaf exposure must be related to increased vine vigour to maintain fruit quality, and a pruning scale on this basis is suggested. The yield per bud from lateral canes, either spurred or long pruned, was greater than bud yields from primary canes with laterals removed.—N.Y. St. agric. Exp. Stat., Geneva.

205. MEL'NIK, S. A., AND ANISIMOVA, V. K.

The effect of tendrils on the quality of vines. [Russian.]

Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 3, pp. 37-9, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 94,114.

Experiments with 5 varieties of table grapes showed that the systematic removal of the tendrils increased the weight of bunches in 2 of the varieties and slightly improved the quality of all 5.

206. BERGMAN, E. L., AND OTHERS.

A comparison between petiole and stem analysis of Concord grapes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 177-82, bibl. 2.

A highly significant correlation between petiole and stem composition was found for N, P, K, Ca, Mg, B and Mn in Concord vines grown for 16 weeks in sand culture. Values associated with petiole and stem composition, when only the correlated nutrient was varied, showed a curvilinear relationship for N, P, K and B. The data indicate that varying other nutrients results in an accumulation of N, P, K and B in petioles rather than in the stems. The reverse was found for Mn. At low levels, N, P, K and B tended to accumulate more rapidly in stems than in petioles. A luxury supply of N, P, K, and B was reflected more in petiole analysis than in stem analysis.—Mich. St. Univ., E. Lansing.

207. AMERINE, M. A., AND WINKLER, A. J.

Maturity studies with California grapes. III. The acid content of grapes, leaves and stems.

Proc. Amer. Soc. hort. Sci., 1958, 71: 199-206, bibl. 17.

Further studies of the changes in soluble solids, titratable acidity, organic acids and pH in the fruit of California grapes are reported. The changes on a juice basis are generally similar to those previously reported [see *H.A.*, 11: 1464 and 12: 1278]. On a per-berry basis the changes follow the same pattern, but are less marked for the organic acid fraction. The changes in expressed leaf material follow the same general pattern as for the fruit, but the changes in organic acid fractions are small. The fluctuation in composition of expressed juice of shoots is even less marked and more irregular. The high buffer capacity of the fruit juice leads to rather smooth titration curves which do not lend themselves to calculation of the organic acid content. [Authors' summary.]—Univ. Calif., Davis.

208. PEYNAUD, E., AND LAFOURCADE, S.

Évolution des vitamines B dans le raisin. (Formation of B vitamins in grapes.) [English and German summaries $\frac{1}{4}$ p. each.]

Qual. Plant. Maveg., 1958, 3/4: 405-14, bibl. 18.

Vitamins of the B complex were separately determined in Merlot and Cabernet-Sauvignon grapes at different stages of ripening. In most instances the maximal content was reached before full maturation, but nicotinamide and mesoinositol

contents were highest in fully ripened grapes and biotin decreased during the later stages of ripening.—Stat. agron. oenol., Bordeaux.

209. OURNAC, A., AND FLANZY, M.

Localisation et évolution de la vitamine B₁ dans le raisin au cours de la maturation. (**Distribution and variation of vitamin B₁ in grapes during ripening.**) [English summary 7, German 6, lines.]

Qual. Plant. Maveg., 1958, 3/4: 415-20, bibl. 4.

In the early stages of ripening the vitamin B₁ concentration was higher in the solid parts of grapes than in the juice, but in fully ripe fruit the juice contained 75-80% of the total, which increased most rapidly during the latter half of August.—Stat. Technol. vég., Narbonne, and Inst. nat. Rech. agron., Paris.

210. RIBÉREAU-GAYON, P.

Les anthocyanes des raisins. (**Anthocyanins in grapes.**) [English and German summaries $\frac{1}{2}$ p. each.]

Qual. Plant. Maveg., 1958, 3/4: 491-9, bibl. 8.

Isolation of 3 pigment types from 12 *Vitis* spp. by paper chromatography shows evidence of a genetical factor and provides a means of identification.—Lab. Œnol. Chim. agric., Fac. Sci., Bordeaux.

211. DURQUETY, P. M.

La génétique des anthocyanes des raisins. (**Genetics of grape anthocyanins.**) [English and German summaries 9 and 10 lines.]

Qual. Plant. Maveg., 1958, 3/4: 500-7.

Vitis vinifera, *V. riparia* and *V. aestivalis* represent 3 distinct groups of vine species based on differences in anthocyanins in the fruit. There is evidence that 2 genetical factors are involved.—I.N.R.A., Pont de la Maye, Gironde.

212. MASQUELIER, J.

Sur quelques propriétés biologiques des anthocyanes et des leucoanthocyanes de la vigne (*Vitis vinifera*) (Première partie). (**Some biological properties of anthocyanins and leucoanthocyanins of the vine (*Vitis vinifera*).** Part 1. [English and German summaries $\frac{1}{2}$ p. each.]

Qual. Plant. Maveg., 1958, 3/4: 481-90, bibl. 23.

Oenocide, the anthocyanin pigment of black grapes, becomes a powerful bactericide after acid hydrolysis, hence the anti-bacterial action of red wines. Unfermented must is inactive in this respect. In a Médoc vintage activity was maximal after 9-10 years.—Lab. Mat. méd., Fac. Méd., Bordeaux.

213. NELSON, K. E., AND TOMLINSON, F. E.

Some factors influencing bleaching and wetness of Emperor and Tokay grapes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 190-8, bibl. 7, illus.

The absorption of SO₂ gas by grapes during fumigation results in localized tissue damage, bleaching, and juice exudation which dries on the skin (wetness). The amount of wetness was proportional to relative humidity during storage, to the amount of botrytis rot, and to the amount of SO₂ to which the fruit was exposed. The number of bleach spots per berry and the diameter of the bleached area round the pedicel were proportional to the amount of SO₂ exposure.—Univ. Calif., Davis.

Nuts.

(See also 217j, k, n.)

214. ICHIKAWA, H.

A few findings in pecan propagation.

J. hort. Ass. Japan, 1958, 27: 101-7, bibl. 23, illus.

Pecan was easily propagated by grafting a dormant scion on a perennial root piece by the veneer method. The union was wrapped in plastic, tied, and the graft kept in a heated bed at 20° C. Hardwood stem cuttings rooted easily in a heated bed at 20° C. also. With both grafts and cuttings callusing occurred within 17 days, and, with the cutting, root tissue differentiation began after about 26 days.—Coll. Agric., Univ. Osaka.

215. ŠOBEK, J.

Ořešákové oblasti. (**Walnut growing areas.**) [Russian and German summaries $\frac{1}{2}$ p. each.]

Studie k rentabilitě vlašských ořešáků. (**Studies on the economics of walnut growing.**) [Russian summary $\frac{3}{4}$ p.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 173-88, bibl. 10, illus., and 293-304, bibl. 9, respectively.

In the first paper the temperature, water, light and soil requirements of walnut trees and their distribution in Czechoslovakia are discussed, and in the second it is recommended that commercial groves should be planted only in the most favourable locations.

216. (ROCKLAND, L. B.)

Making walnuts keep better.

Agric. Res. Wash., 1958, 7 (2): 6, illus.

The rate of rancidification of walnut meat was slowed down by a light coating of an invisible tasteless antioxidant. Walnuts were most stable at a moisture content of 3.2-3.7%. By adjusting the moisture content to this level and packaging in moisture-vapour resistant bags, the storage life of kernels was prolonged.—Fruit Veg. Chem. Lab., Pasadena, Calif.

Noted.

217. a **BADELL ROIG, L.**
Poda en verde de la vid. (Summer pruning of vines.)
Rev. Inst. agric. catal., 1958, **107**: 151.
Advice on the manner and timing of dis-budding, heading back, shoot thinning, tipping and defoliation.
- b **ČAROČKIN, M. M.**
Results of raspberry variety trials in the North. [Russian.]
Sad i Ogorod, 1958, No. 8, pp. 58-9.
Of 64 varieties tested at Syktyvkar, Komi ASSR, the following very hardy raspberries were the most promising: Novost Ku'zmina, Visluha, Tekstil'naja, Usanka, and Spirina želtaja.
- c **COMUZZI, A.**
La meccanizzazione negli impianti viticoli. (Mechanization in vineyards.)
Riv. Vitic. Enol., 1958, **11**: 271-5, bibl. 1, illus.
Using a tractor post hole digger for making planting holes.
- d **DAVIES, J. R.**
Strawberries for the interstate trade.
Tasm. J. Agric., 1958, **29**: 247-9, illus.
Advice on packing and marketing.
- e **DENNIS, C. C.**
Strawberry processing costs.
Calif. Agric., 1958, **12** (9): 2, 15-16.
Cost-reducing adjustments which may be made during freezing processes.
- f **GEISLER, G., AND STAAB, J.**
Versuchsanstellung im Weinbau. (On the lay-out of vine experiments.)
Vitis, 1958, **1**: 257-81, bibl. 36.
Recommendations on design and analysis based on experimental results.
- g **LARSSON, G.**
Jordgubbsförsök vid Öjebyns försöksstation 1954-1957. (Variety trials with strawberries at Öjebyns [Sweden] 1954-57.) [English and Esperanto summaries $\frac{3}{4}$ p. each.]
Medd. Trädgårdsförs. Malmö **112**, 1958, pp. 9, bibl. 6, illus.
Indra was the best of 8 varieties.
- h **MAINGONNAT, A.**
Les cépages musqués. (Muscat grape varieties.)
Tunis. agric., 1958, **59**: 89-96.
Notes on 7 white, 2 black and 2 raisin varieties of Muscat grapes and their culture.
- i **NORTON, J. S.**
Machinery for assisting hand operations in the production of strawberries and other low-growing truck crops.
A.R. Fla agric. Exp. Stats. 1956-57, p. 40, illus.
Incorporating comfortable seats plus maximum output.
- j **NOVASIO, D.**
L'ortofrutticoltura del Mezzogiorno e il M.E.C. (Fruit growing in southern Italy and the European Common Market.) [French, English and German summaries 9 lines each.]
Frutticoltura, 1958, **20**: 456-62, illus.
Production and trade in grapes (particularly the variety Regina), almonds and citrus fruits, with brief reference also to dried figs.
- k **O'BRIEN, M.**
Mechanical sampler for almonds.
Calif. Agric., 1958, **12** (8): 3, 14, illus.
Pneumatic device for sampling unshelled almonds in bins as delivered by growers.
- l **PETRAHILEV, I. M.**
Intergeneric hybrids of raspberry. [Russian.]
Priroda, 1958, **47** (8): 109-11, illus.
Progeny of interspecific raspberry hybrids $\times$ strawberry hybrids.
- m **SAHLSTRÖM, H.**
Sortförsök med jordgubbar 1950-1956. (Variety trials with strawberries, 1950-1956.) [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs. Malmö **109**, 1957, pp. 28, bibl. 15.
Behaviour of 31 varieties in 7 different localities.
- n **SCARAMUZZI, D.**
Colture legnose in Puglia. Considerazioni sulla produttività e sul Mercato Comune Europeo. (Woody crops in Apulia. Comments on productivity and on the European Common Market.) [French, English and German summaries 4, 4 and 3 lines.]
Frutticoltura, 1958, **20**: 503-12.
Almonds, olives and grapes.
- o **SCHIEMANN, E.**
Beobachtungen an einen subfertilen Fragaria-Klon. (Observations on a sub-fertile *Fragaria* clone.)
Planta, 1958, **52**: 77-95, bibl. 8, illus.
The cross of two octaploid strawberries resulted in a plant with malformed leaves and flowers.—ForschStelle Gesch. Kulturpfl., Max Planck Ges. Berlin-Dahlem.
- p **STAFFORD, H. A., AND LOEWUS, F. A.**
The fixation of C¹⁴O₂ into tartaric and malic acids of excised grape leaves.
Plant Physiol., 1958, **33**: 194-9, bibl. 30.
See also *H.A.*, 28: 3285s.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 73, 74, 311u, 1007.)

218. CROSS, C. E., AND OTHERS.

The Cranberry Station, East Wareham, Mass.
A.R. Mass. agric. Exp. Stat. 1955-56, pp. 26-9.

Weed control: Many cranberry weeds were killed by amino-triazole, without toxic effects on cranberry plants. Copper sulphate at 20 lb. in 100 gal. at 600 gal. per acre gave selective control of sphagnum moss. Iron sulphate mixed with sodium chloride (4 : 1) and scattered dry at 20 lb. per sq. rod in June and July gave promising selective control of wild bean. **Cranberry insects:** *Sparganothis sulfureana* was not controlled by an aerial spray of 9% DDT, ground-applied sprays of 50% DDT, TDE or methoxychlor, or 2.5 lb. of 25% malathion wettable powder in 100 gal. water applied at 400 gal. per acre; 50% of nearly full-grown second-generation larvae were killed by a spray of 2 lb. 15% parathion per 100 gal. Blueberry maggot [*Rhagoletis pomonella*] was controlled by 50 lb. 4% malathion dust. A pre-blossom spray of 1 pint 18.5% endrin emulsion per 100 gal. controlled cyclamen mites on strawberries. **Cranberry diseases:** Ferbam, zineb and captan at 2 lb. per 100 gal. reduced cranberry fruit rots. Two applications of 13 lb. zineb in 13 gal. of water or in 37 lb. talc per acre, applied by helicopter, reduced fruit rots. Ferbam, zineb and captan applied twice by mist blower at 1 lb. per gal. and 13 gal. per acre reduced fruit rots within 20 ft. of the blower, but were ineffective at 60 and 100 ft. from the blower.

Disturbances of nutrition or of unknown origin.

(See also 40, 162, 163, 311c, 312k.)

219. KEMMER, E.

Zur Frage des artgleichen Nachbaues bei Apfelgehölzen. (**The problem of replanting when apples follow apples.**)
Obstbau, 1957, 76: 18-20, illus.

Symptoms of growth repression in old apple soil occurred more readily in young plants than in older plants, and it is suggested that young root systems may be more sensitive to soil conditions. Symptoms of soil sickness were induced by foliar sprays of 2,3,5-triiodobenzoic acid. Low annual growth increments were observed with vigorous scions on Paradise stocks, but normal growth occurred after inarching with seedling stock. Root excavations of trees planted in old apple soil showed that the new roots followed old pathways.

220. GÄRTEL, W.

Untersuchungen über das Auftreten von Kalimangel in Amerikaner-Schnittgärten.

(Studies on the occurrence of potassium deficiency in mother plants of American rootstocks.)

Reprinted from *Weinberg u. Keller*, 1958, 5: 267-87, bibl. 69, illus.

In American vine stocks growing on the lower slopes of the Moselle Valley necrotic areas have frequently been observed on the leaves. Studies have shown that symptoms are due to potassium deficiency. Soil injections of 40-100 g. K_2O per vine improved plant health within a year. Before planting nurseries on a loamy soil with high available Mg, application of 2,000 kg./ha. K_2O (but not potassium magnesium sulphate) is recommended.—Inst. Weinb., Bernkastel.

221. HANSEN, C. J., PROEBSTING, E. L., AND TORPEN, E.

Boron requirements of prunes.

Calif. Agric., 1958, 12 (8): 8, 13, illus.

Soil and foliage applications and branch injections of B were given to B-deficient prunes in un-irrigated and irrigated plots. Foliar applications of 66% boron trioxide at 1 lb./100 gal. increased yields and reduced symptoms of bushy branch. Leaf analyses showed that there was substantial B uptake. In un-irrigated orchards autumn applications of borax were not absorbed quickly enough to correct deficiency symptoms by the following growing season. In small-scale trials branch injections were effective. A single foliage spray in early summer is recommended for initial treatment of deficient trees.

222. HOUSTON, C. E., AND MEYER, J. L.

Apricot irrigation studies.

Calif. Agric., 1958, 12 (9): 6.

Salts accumulated in apricot orchard soil during irrigation with San Joaquin River water and excess water was supplied to remove accumulations. In a leaching trial 77 in. of water per acre were applied in 1956, and 62 in. in 1957 (the apricots' consumption in 1957 was 33 in.). There were no visible signs of salt damage and apricot yield was 13 tons per acre.

223. HALSEY, D. D., MCFARLANE, N. L., AND SCHUT, R. J.

Sodium leaf scorch of apricot.

Calif. Agric., 1958, 12 (9): 4-5, illus.

Symptoms of sodium scorch were curling and burning of leaf margins, especially of the spring flush, followed by poor fruit set and wilting. Leaf analyses showed abnormally high content of Na and Cl. Sodium scorch in an orchard was substantially improved by heavy irrigation which thoroughly wetted the soil to a depth of 20 ft. Growth improvement was apparent with new growth the following spring.

224. ASKEW, H. O., AND CHITTENDEN, E.

The effect of magnesium top dressings on the growth of young apple trees.

N.Z. J. agric. Res., 1958, 1: 796-9, bibl. 1, illus.

In 1951 two young Sturmer apple trees were planted in an orchard to replace trees that had died from Mg deficiency. One site had received 12 lb. dolomite + 7 lb. magnesium sulphate in 1947 and 6 lb. dolomite in 1949, and it was given a further 6 lb. dolomite in 1952. The second site had received no Mg. Both young trees were supplied with a standard NPK dressing. The minus-Mg tree showed severe premature defoliation from the second year onwards and at the end of the fourth year was 4 ft. 6 in. high compared with 6 ft. 10 in. for the Mg-treated tree.—Cawthron Inst., Nelson.

225. WARD, J. R.

Magnesium deficiency in apples in the Huon valley of Tasmania.

Tasm. J. Agric., 1958, 29: 238-46, bibl. 9, illus.

In all cases investigated Mg deficiency followed high applications of K. Recommendations for control are to omit K from the fertilizer programme until the deficiency is corrected, apply $\frac{1}{2}$ ton/a. dolomite and 5 to 7 sprays of Epsom salt at 20 lb. per 100 gal. starting at the calyx stage. It may be mixed with most normally-used fungicides and insecticides except lime-sulphur and, possibly, malathion. In general dolomite should be used rather than lime.

Climatic factors.

(See also 34-36, 71n, 81, 95, 96, 105, 106, 183, 199, 311n, 312g, n.)

226. KEMMER, E., AND STECKEL, W.

Zur Frage der Veränderung von Holzfrostschäden bei Obstgehölzen. (On the question of changes in the degree of frost injury sustained by the wood of fruit trees.)

Züchter, 1958, 28: 237-41, bibl. 2, illus.

In pursuance of earlier experiments by Thiele [*H.A.*, 27: 1094] the authors found that estimations of the degree of frost injury apparently suffered by fruit trees in the spring soon after a freezing test were not a reliable guide to later behaviour. Severely discoloured seedlings sometimes remained alive, while seedlings showing no discoloration often died. In order to clarify the problem further, the natural frost injury sustained by some 3,350 trees (largely apples, but also several hundred pears and plums and 61 cherries) during the bad winter of 1955/56 was evaluated first in the spring of 1956 and again in the autumn of 1957. The findings on these two occasions are reported in detail, and it is concluded that a second evaluation of frosted trees is indispensable, if a reasonably

accurate assessment of injury is desired. It was also observed that 11- to 20-year-old trees in full bearing proved more susceptible to frost than those of other age groups, especially 6- to 10-year-old trees. Malling XI showed good resistance, but Malling IX was very tender.—Inst. Obstb. tech. Univ. Berlin.

227. BELVIGLIERI, G., AND FRACCAROLI, S.

Osservazioni sul comportamento del vitigno Garganega dopo interventi a seguito delle gelate tardive del 1957 in provincia di Verona. (Observations on the response of the vine variety Garganega to remedial measures following the late frosts of 1957 in the province of Verona.)

Riv. Vitic. Enol., 1958, 11: 247-52, illus.

Prompt removal of frost-damaged shoots or parts of shoots resulted in satisfactory regeneration from secondary buds and in fruit production 60-70% of normal, followed by perfect ripening of the wood. Untreated vines produced only about $\frac{1}{4}$ of the normal yield.

228. EIDG. KOMMISSION ZUM STUDIUM DER HAGELBILDUNG UND HAGELABWEHR.

Grossversuch III zur Bekämpfung des Hagels im Tessin. I. Versuchsjahr. Tätigkeitsbericht No. 10, 1957. (Tenth annual report on the large-scale trials on the prevention of hailstorms in the Ticino [Switzerland] for 1957, 1st year of trial III), 1958, pp. 111, 2 plates, illus.

The new series of trials is distinguished from the two earlier ones in that it is based on a statistical design of the experiments and on a considerable extension of the area in which AgI generators are placed. It is too early to evaluate results for 1957. See also *H.A.*, 25: 1442 and 3700.

229. POWER, A.

Vroegtijdige bladval bij Golden Delicious. (Premature leaf-fall in Golden Delicious.)
Fruitteelt, 1958, 48: 868.

Premature leaf-fall is a result of disturbed water relations due to the sudden onset of warm dry conditions in July. Leaf-fall was aggravated by sprays of captan and TMTD while sulphur sprays were much less harmful.—Rijkstuinbouwconsulentschap, Kesteren.

Viruses.

(See also 99, 174.)

230. LUCKWILL, L. C.

Virus diseases of fruit trees: VI. Graft transmission of chat fruit.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 56-9, bibl. 1.

An experiment has confirmed that the chat fruit condition of the apple variety Lord Lambourne is a

graft-transmissible disease caused by a virus. A distinct effect on fruit size was evident in the first year after inoculation with bark chips and buds obtained from two infected trees. Some differences in response to the two sources of inoculum may indicate the existence of more than one strain of the virus.

231. KIENHOLZ, J. R.

Are viruses concerned in pear decline?

Plant Dis. Repr., 1958, **42**: 1194-5, bibl. 3.

Observations, reported briefly, suggest that, if certain viruses are present in trees consisting of French scions (*P. communis*) worked on Oriental rootstocks (*P. pyrifolia* or *P. betulaefolia*) or vice versa, pear decline symptoms excited by other factors, notably incompatibility, may be hastened or aggravated.—U.S. Dep. Agric., Hood River, Ore.

232. POSNETTE, A. F., AND CROPLEY, R.

Quince indicators for pear viruses.

J. hort. Sci., 1958, **33**: 289-91, bibl. 2, illus.

Two quince clones, propagated from seedlings of Quince E (Portugal Quince) have proved to be suitable indicators for the viruses latent in pear [see also *H.A.*, 27: 1264]. By their use two viruses, in addition to those previously described, were identified in pear varieties. Yellow blotch virus occurred only in Packham's Triumph pear, but bark necrosis virus was found in several varieties including Clapp's Favourite, Beurré Hardy and Williams' Bon Chrétien. [Authors' summary.]—East Malling Res. Stat.

233. FINK, H. C.

Indexing sour cherry trees for necrotic ring spot on excised twigs.

Abstr. in *Phytopathology*, 1958, **48**: 461.

Sour cherry trees can be indexed for necrotic ring spot virus by inoculating dormant twigs excised from them. A bud from a tree known to be infected with the virus is grafted between 2 axillary buds on the twig. The proximal end of the twig is immersed in a 3-p.p.m. gibberellin solution. The twigs are held under conditions suitable for growth; tap water is added to the solution as required. Symptoms will appear on the newly unfolding leaves of twigs cut from ring-spot-free trees; conversely, symptoms will not appear on leaves of twigs cut from infected trees. Another method is to insert a bud from trees to be indexed on twigs cut from ring-spot-free trees. Symptoms indicate the tree being indexed as "virus" infected. The number of bud sticks to be used for each tree to be indexed depends upon the size of the tree, since the virus may not be distributed equally throughout a newly infected tree. One stick from a nursery tree should be sufficient. This method of indexing may prove valuable in disease surveys, virus spread studies, and nursery certification programs where large numbers of trees have to be indexed annually.

234. HULL, J., Jr., AND KLOS, E. J.

Responses of healthy, ring spot-, and yellows virus-infected Montmorency cherry trees to gibberellic acid. A preliminary report.

Quart. Bull. Mich. agric. Exp. Stat., 1958, **41**: 19-23, bibl. 4.

Foliar applications of 100 p.p.m. gibberellic acid were made to 1-year-old Montmorency cherry trees that had been budded with healthy, cherry yellows virus- and ring spot virus-infected buds. The number of trees used was small but the trend observed was quite definite, viz. that all treated trees had longer shoots of greater diameter than the unsprayed trees. It is concluded that gibberellic acid should be evaluated further as a means of counteracting the stunting effect of virus diseases.

J.R.L.

235. BLODGETT, E. C., AND TWOMEY, J. A.

Virus gummosis of apricot.

Phytopathology, 1958, **48**: 435-7, bibl. 2, illus.

A new disease of *Prunus armeniaca* L., affecting Royal and Tilton and caused by a virus easily transmitted by budding, is named virus gummosis. Symptoms consist of profuse gumming on branches and trunks, necrosis and dieback of new shoots, a lace-leaf effect, and dead, punky areas in the fruit. [Authors' summary.]—*Irrig. Exp. Stat.*, Prosser, Wash.

236. KENKNIGHT, G.

Thermal stability of peach rosette virus.

Phytopathology, 1958, **48**: 331-5, bibl. 6, illus.

In an experiment in which entire peach trees were given hot-water-bath treatment, the thermal death times of peach rosette virus appeared to be less than 90 min. at 45° C., about 18 min. at 50° C., and about 2 min. at 55° C. When nurse trees were grafted to rosetted or rosette-inoculated trees the thermal death time of the virus was over 60 min. at 50° C., and 10 min. at 56° C.—U.S. hort. Field Lab., Fort Valley, Ga.

237. LISTER, R. M.

Soil-borne virus diseases in strawberry.

Plant Path., 1958, **7**: 92-4, bibl. 8, illus.

Transmission tests are described, which demonstrated that certain strawberry plants, suffering from disorders resembling those caused by eelworms, severe crinkle virus or shallot aphids, were in fact infected with soil-borne viruses. The symptoms caused in several strawberry varieties by two such viruses, raspberry ringspot and raspberry yellow dwarf, are described.—*Scot. hort. Res. Inst.*, Invergowrie.

238. MILLER, P. W.

Comparative efficiency of excised leaf-petiole grafts and stolon grafts for transmitting certain strawberry viruses.

Plant Dis. Repr., 1958, **42**: 1043-7, bibl. 8, illus.

A modification of the leaf-petiole grafting technique developed by Bringhurst and Voth [*H.A.*, 28: 2335] is described. Preliminary results indicate that the method is as efficient as the stolon-graft method for indexing the various virus components found in strawberries in the Pacific Northwest.—U.S.D.A. and Ore. agric. Exp. Stat.

239. POSNETTE, A. F., AND CROPLEY, R.

Heat treatment for the inactivation of strawberry viruses.

J. hort. Sci., 1958, **33**: 282-8, bibl. 16, illus.

In experiments on the inactivation of strawberry viruses, potted plants were maintained for periods up to 50 days at 37° C. Plants of 20 varieties were freed from mottle virus by treatment for various periods, the shortest being 6 days for Perle de Prague. Varieties differed in the period required for permanent virus inactivation and this variation was attributed to varietal differences and probably to virus strains differing in heat tolerance. Crinkle and yellow edge viruses are more difficult to eliminate than mottle. With crinkle treatment at 37° C. for periods of 30 to 50 days appears to have been effective; with yellow edge, the corresponding period was 26 days. After heat treatment, plants that were not permanently cured frequently remained symptomless and without transmissible virus much longer than the normal incubation period of the viruses present. It is suggested that this might be due to partial cross-protection by avirulent strains that have been less affected than the pathogenic strains by the heat treatment. [Authors' summary.]—East Malling Res. Stat.

240. DOBIE, N. D., AND OTHERS.

New facilities and procedures used for growing disease-free strawberry plants in Oregon.

Plant Dis. Repr., 1958, **42**: 1048-50, bibl. 3, illus.

The Oregon Strawberry Plant Propagation Center, established in 1954, has already been described [*H.A.*, 26: 3531]. Developments since then include the erection of a large insect-proof glasshouse fitted with evaporative coolers and the general adoption of the leaf-petiole grafting technique for indexing plants for virus diseases. In 1958 stocks of 28 varieties and selected seedlings were available that had passed all tests for diseases, insects and nematodes.—Ore. agric. Exp. Stat. and U.S.D.A.

241. BOVEY, R.

Premiers résultats d'expérimentation et de culture de fraisiers sans virus régénérés par thermothérapie. (Preliminary results of growing heat-treated virus-free strawberries.) *Rev. romande Agric. Vitic.*, 1958, **14**: 65-7, bibl. 3, illus.

Differences in growth and yield of virus-free and virus-infected plants of Mme. Moutot were

observed. Yields from healthy plants were 30% higher and fruits were larger than from infected plants.—Stats féd. Essais agric., Lausanne.

242. HELEBRANT, L.

Příspěvek k poznání virových chorob maliníku a ostružiníku. (Virus diseases of raspberry and blackberry.) [English and Russian summaries 1½ pp. each.] *Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba*,

1958, **31**: 599-620, bibl. 60, illus.

A survey of virus and virus-like symptoms on raspberry and blackberry in Czechoslovakia is followed by notes on natural spread and a description of experiments on transmission. The usual protective measures, i.e. selection of virus-free stock, aphid control, heat inactivation and breeding for resistance, are summarized.

Bacteria.

(See also 311e, 312c, 977.)

243. WEBBER, R.

Copper and agromycin used for control [of fire blight of pears].

Grower, 1958, **50**: 767-8, illus.

The present methods being used to control fire blight (*Erwinia amylovora*) of pears are: cutting out the infected parts, the use of copper and antibiotic sprays, the encouragement of mycorrhiza and the use of resistant varieties. In America Richard Peters is said to be immune; Orient, Hood and Pineapple highly resistant; Baldwin, Waite and Ewart fairly resistant and Kieffer slightly resistant.

244. CROSSE, J. E., AND GARRETT, C. M. E.

Experiments on the movement of streptomycin in cherry trees.

Ann. appl. Biol., 1958, **46**: 310-20, bibl. 11, illus.

Penetration of streptomycin into cherry leaves appreciably suppressed infection with *Pseudomonas mors-prunorum*. In detached leaves the uptake of the antibiotic was progressive with time. Wide-spread and rapid distribution of the antibiotic in the transpiration stream resulted from petiolar injection. Immersion of the laminae of intact leaves in the antibiotic resulted in a much slower translocation, possibly occurring in the transpiration stream. Evidence suggests that the antibacterial activity detected in fruiting spurs after field spraying is not dependent on the presence of leaves, but results from direct penetration of the antibiotic through the dermal tissues of the spur. It was concluded that foliar sprays at field concentrations were unlikely to result in significant systemic distribution of the antibiotic, but that localized activity might be an important factor in the control of bacterial canker. [From authors' summary.]—East Malling Res. Stat., Kent.

245. BOYD, A. E. W., AND PATON, A. M.

Trial of antibiotic paint for control of bacterial stem canker of plum.

Plant Path., 1958, 7: 88-91, bibl. 4.

An emulsion paint containing streptomycin [10,000 i.u./ml.], when applied to the stems of young Victoria plum trees, reduced markedly the incidence of bacterial stem canker [*Pseudomonas* sp.] in a trial under field conditions in Scotland. The unwounded stem showed a high degree of resistance to penetration by high concentrations of the pathogen. The practice of tying young trees, leading to abrasions, may promote the infection of the stem. The health of the operators was unaffected by extensive use of the streptomycin preparations. [Authors' summary.]—Edinb. E. Scot. Coll. Agric.

Fungi.

(See also 165-167, 311f, h-m, o, x, 312a, e, f, h, o.)

246. BYRDE, R. J. W., AND WAUGH, N. M.

Preliminary tests of potential orchard fungicides.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 89-93, bibl. 13.

Eleven compounds were tested for their ability to inhibit spore germination of *Venturia inaequalis* and mycelial growth of *Sclerotinia laxa*. On the basis of these preliminary tests, *n*-dodecyl-guanidine acetate, 2: 4-dichloro-6-(*o*-chloroanilino)-*s*-triazine and *o*-hydroxydiphenyl appear to warrant field testing; the latter compound, however, was liable to cause phytotoxicity at 0.1%. [Authors' summary.]

247. BYRDE, R. J. W., CLARKE, G. M., AND HARPER, C. W.

A three-year comparison of captan and lime sulphur as post-blossom fungicides on Cox's Orange Pippin apples.

J. hort. Sci., 1958, 33: 244-53, bibl. 14.

Spraying experiments against apple scab at Long Ashton, 1957.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 93-7, bibl. 7.

Captan (0.075%) and lime sulphur (0.75%) were compared as post-blossom fungicides, following lime sulphur pre-blossom, on the apple variety Cox's Orange Pippin in 1954-6. A randomized block layout was used in which treatments were re-allocated each year. The incidence of apple scab was very low throughout the trial. Apple mildew was more severe on plots receiving captan. The use of captan on trees on M.II rootstock was followed by a mean increase in crop weight of 25 lb. per tree, representing a 42% increase. With trees on M.IX there was little effect on crop weight, but fruit russetting was largely prevented. Critical examination of the data, together with those

obtained after a uniform spray treatment in 1957, indicated a residual effect of the previous season's sprays on apple mildew incidence and, on M.II rootstock only, on crop weight; both tended to be higher following captan. It is concluded that a major consideration in the commercial use of captan is its relative economic effects on mildew and yield in a given orchard. [From authors' summary to first paper.] The second paper describes results obtained in the third year of the same experiment.

248. TURNBULL, J.

Yes indeed we can control apple mildew.

Grower, 1958, 50: 769-71.

The results of the Kent spraying competitions are reviewed and indicate that at least 5 sprays (3 in May and 2 in June), each containing not less than 6 pints 50% colloidal sulphur in 50 gal. per acre or the equivalent in other forms of sulphur, are needed to control mildew.

249. BURCHILL, R. T.

Observations on the mode of perennation of apple mildew.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 114-23, bibl. 3, illus.

An anatomical study of the development of mycelium of *Podosphaera leucotricha* in buds of Cox's Orange Pippin is described in detail, and the results of a preliminary trial on methods of reducing bud infection by spraying are outlined. Post-blossom applications of lime sulphur and Karathane proved of value in reducing overwintering mildew in fruit buds, whereas pre-blossom sprays were completely ineffective.

250. HEUBERGER, J. W.

Fungicides and the control of *Botryosphaeria ribis* fruit rot of apple.

From abstr. in *Phytopathology*, 1958, 48: 461-2.

Various fungicides were compared on Rome apples in 2 spray schedules: (a) pre-pink to first cover sprays, (b) fourth cover spray to harvest. Best control of *Botryosphaeria ribis* in the field was given by captan, Magnetic 70 sulphur+captan, and Phylam-S in schedule a, followed by captan+zineb in schedule b. After harvest the fruits were cold-stored for 94 days, then held at room temperature for 7 days. Percentage rot in the unsprayed fruit was 54, compared with 9, 18 and 15 for the 3 best treatments.

251. LEWIS, F. H., AND HICKEY, K. D.

Effective life of fungicides as a factor in the control of sooty blotch and fly speck on apple.
Abstr. in *Phytopathology*, 1958, 48: 462.

Control of sooty blotch, caused by *Gloeodes pomigena* (Schw.) Colby, and of fly speck, caused

by *Microthyriella rubi* Petr., was obtained under epiphytotic conditions with ferbam, zineb, glyodin, and lead arsenate sprays last given in August, on apples harvested in October. Captan and thiram failed under these conditions. In fungicide-agar tests, greatest growth suppression was provided by ferbam, followed by captan and zineb. Glyodin and lead arsenate had little effect. In spore germination trials, glyodin, captan, zineb, and ferbam were more effective than lead arsenate. In an effort to explain the performance of captan and zineb, orchard sprays were discontinued at half-month intervals from petal-fall (14 May) to 3 September. Captan controlled sooty blotch and fly speck until the last spray treatment, after which visible sooty blotch lesions appeared in 35–40 days. Zineb gave control for 60 days. Residue data did not offer an adequate explanation for the rapid failure of captan. The effective life of the spray residue seems to be the major factor involved in these results. The performance of lead arsenate, and perhaps thiram, can be explained on the same basis.

522. SHARPLES, R. O.

The reduction of orchard sources of *Gloeosporium* disease.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 105-14, bibl. 10, illus.

Studies on sources of orchard infection of *Gloeosporium* [*Neofabraea*] *perennans* and *G. album* and on factors affecting the susceptibility of pruning cuts to infection by *G. perennans* are described. The discovery of the perfect stage of *G. perennans* on overwintered detached wood is recorded. In trials in 1956 a 0.3% phenyl mercury chloride (PMC) emulsion paint and, to a lesser extent, a 0.6% sodium penta-chlorophenate emulsion paint applied to cankers in July caused substantial reductions in sporulation. In 1956 PMC applied as a paint and also as a spray in 2% linseed oil emulsion, both at 0.3%, caused substantial reductions in sporulation. In 1957 PMC applied as a paint and also as a spray in 2% linseed oil emulsion again caused substantial reductions in sporulation, but the cost of applying PMC at such a concentration would be prohibitive in commercial practice.

523. MONTGOMERY, H. B. S.

Effect of storage conditions on the incidence of *Gloeosporium* rots of apple fruits.

Nature, 1958, 182: 737-8.

Data are presented on the development of *Gloeosporium perennans* and *G. album* on apples from 8 localities during cold storage at 37° F. and gas storage (3% oxygen and 5% carbon dioxide) at 39° F. Where *G. album* predominated, total rotting was very much higher in cold than in gas storage. Where *G. perennans* predominated the reverse was observed.—East Malling Res. Stat., Maidstone, Kent.

254. TERUI, M., AND KAGAWA, H.

The influence of trichomycin on the germination of the apple blossom-blight fungus and apple pollen. [Japanese, with English summary $\frac{1}{2}$ p.]

Bull. Fac. Agric. Hirosaki Univ., 1957, No. 3, pp. 21-5, bibl. 17.

It was found that 50 γ /c.c. trichomycin effectively inhibited germination of spores of *Sclerotinia mali* without affecting germination of the apple pollen. It is not, however, considered to be suitable for control of the disease in the orchard, though it could be used as a standard in future experiments.

J.R.L.

255. ERCOLANI, G. L.

Infezioni di *Monilia* su pero conseguenti ad ustioni di polisolfuri. (*Monilia* [*Sclerotinia*] infections on pear trees due to polysulphide burns.)

Inf. fitopat., 1958, 8: 198-9, illus.

Symptoms of *Sclerotinia* infection are distinguished from those caused by *Nectria*. The use of polysulphide fungicides at too high a concentration, or when spring frosts occur, injures leaves, stems and even branches, giving access to *Sclerotinia*. Where infection is suspected, winter sprays of mineral or anthracene oils are advised, and where it is confirmed, removal of diseased parts is essential and spraying with wettable sulphur is advocated.

256. OSTERWALDER, A.

Von einer häufigen, aber noch unbekannten Blattkrankheit der Hauszweitschge. (Of a frequently occurring, but still unknown leaf-spot disease of damson.)

Schweiz. Z. Obst- u. Weinb., 1958, 67: 450-3, illus.

In a preliminary study the pathogen of the leaf-spot has been identified as *Sphaceloma* sp., probably *S. pruni* n.sp. It is thought that 2 applications of lime-sulphur, in the middle of July and a fortnight later, should control the disease, which causes only moderate damage. Biology of the fungus and symptoms are briefly discussed.

257. OGAWA, J. M.

The influence of emanations from fruits of *Prunus* species on spore germination of the brown-rot organisms.

From abstr. in *Phytopathology*, 1958, 48: 396.

Green fruits of peach produced inhibitory effects on germination of spores of *Sclerotinia fructicola*, whereas ripe fruits of peach, apricot and cherry produced stimulatory effects on spore germination of both *S. laxa* and *S. fructicola*.

258. ASHOUR, W. A., AND ALLAM, M. E.

Experiments on the control of shot-hole disease of peach trees in Egypt. [Arabic summary $\frac{1}{2}$ p.]

Ann. agric. Sci. Cairo, 1957, 2 (1): 23-33, bibl. 9, illus.

Bordeaux sprays did not decrease the amount of shot-hole (*Clasterosporium carpophilum*) infection of peach trees, but a significant reduction of infection was obtained with dormant season lime sulphur sprays in the second of 2 successive years.—Univ. Ain Shams, Cairo. J.R.L.

259. DAINES, R. H., AND OTHERS.

Control of *Fusicoccum* canker of peach by nutrition, defoliation, and protective fungicides.

Phytopathology, 1958, 48: 400-7, bibl. 20, illus.

Nodal cankers produced on peach trees by *Fusicoccum amygdali* Del. appear throughout the year, with peak occurrence in spring and fall. Field and greenhouse experiments showed that twig infections occur at unhealed bud scales, fruit and leaf scars, at the blossoms, and at points of mechanical injury to twigs, buds, leaves and fruit. Laboratory studies indicated that resistance to the disease is related in part to the development of protective cork layers or periderm at these surfaces, and to the nutritional status of the trees. Study of the fungus in artificial media indicated the following conditions to be favourable for growth and fruiting: 80–85° F. temperature, constant light, high sugar concentration and certain organic nitrogen sources. Control may be achieved with protective materials [carbarnates, dichlone or captan] applied at the delayed dormant stage and continuing through the spring, summer, and leaf-dropping stages. Forced defoliation with a cyanamid spray or dust shortens the period during which protective leaf drop sprays are needed and ensures periderm development. Since a periderm imparts protection to scars, the defoliant or fungicides used should not adversely affect its development. Cultural and fertilizer practices should be such as to avoid excessively high nitrogen in trees in the fall. [Authors' summary.]—N.J. agric. Exp. Stat., New Brunswick.

260. JAFAR, H.

Studies on the biology of peach rust (*Tranzschelia pruni-spinosae* Pers.) in New Zealand.

N.Z. J. agric. Res., 1958, 1: 642-51, bibl. 4, illus.

Peach rust occurs on peaches and other stone fruits in all fruit-growing districts of New Zealand. *Anemone coronaria* is the only plant in which pycniosori and aecidiosori occur, but is unimportant in spreading the disease, which overwinters as uredosori on the twigs of stone fruits. Nearly all the varieties of stone fruits grown in New Zealand are susceptible to rust, but the degree of susceptibility varies. Data on varietal susceptibility are presented for 13 peaches, 2 nectarines, 4 plums and 6 apricots. Eight cherry varieties examined in 1957–58 were free from rust.—D.S.I.R., Auckland.

261. JAFAR, H.

Investigation on the control of peach rust (*Tranzschelia pruni-spinosae* Pers.).

N.Z. J. agric. Res., 1958, 1: 660-4, bibl. 4.

All fungicides tested were effective against peach rust (*Tranzschelia pruni-spinosae*), but zineb, captan and thiram were decidedly superior to lime sulphur plus colloidal sulphur. Zineb appeared to be more effective than captan and thiram, although differences in control failed to reach significance at the 5% level. Soil treatment with K, P, and N fertilizers had no significant effect on incidence of peach rust, although the tests suggested that heavy application of N tended to increase degree of infection. Spraying of foliage with zinc sulphate plus hydrated lime reduced rust infection on peaches, but the reduction failed to reach significance at the 5% level. Three spray applications during the January–March period following an application in November are likely to keep this rust under control. [Author's summary.]—D.S.I.R., Auckland.

262. ENGLISH, H.

Physical and chemical methods of reducing *Phomopsis* canker infection in Kadota fig trees.

Abstr. in *Phytopathology*, 1958, 48: 392.

Although *Phomopsis cinerescens* infects Kadota fig trees largely through pruning wounds, spray applications of organic or inorganic fungicides immediately before and/or after pruning have been of little value in control. Neither a standard siliceous-base wound dressing (Tree Seal) nor a fungicidal wax emulsion (Vanseal Wax plus Vancide 51) was effective in reducing infection when painted on fresh wounds. Covering the branch stubs after pruning with firmly secured plastic caps resulted in a 60% reduction in disease incidence, and painting the wounds with either bordeaux paste or a 1% solution of Tag Fungicide (phenylmercuric acetate) before affixing the plastic reduced the incidence by about 76%. Similar control was obtained with Tag Fungicide alone at a concentration of 4%. When a synthetic latex material (Rhoplex AC-33) that dries to an elastic film, was combined with Coromerc (*N*-phenylmercuriethylenediamine) and painted on pruning wounds, disease was reduced 75%. Much less control was obtained when either Coromerc or Rhoplex AC-33 was used alone. Another method of reducing the amount of canker is to prune late in the dormant season, as shown by the fact that, during a 3-year period, trees pruned during February, March and April developed 58, 42 and 27% infection, respectively.

263. VENKATAKRISHNIAH, N. S.

Control of fig rust caused by *Cerotelium fici* (Cast.) Arth.

Mysore agric. J., 1958, 33: 25-6.

"Ultrasulphur" solution, 1 lb. in 30 gal., gave satisfactory control when sprayed 4 times at 25–30-day intervals, starting when the fruits were the size of marbles.

264. THOMPSON, B. D.

Post-harvest chemical treatments for the control of strawberry fruit rots.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 224-30, bibl. 6.

Among several chemicals tested as post-harvest dips, captan and dehydroacetic acid were effective in controlling fruit rots produced by *Botrytis cinerea*, *Rhizopus nigricans* and an unidentified fungus. Dehydroacetic acid (Na salt) was more effective than captan, and the best results were obtained using 0.5–1% as a dip for less than 5 min. Higher concentrations or longer treatment resulted in some berry injury.—Fla agric. Exp. Stats, Gainesville.

265. BECKER, R. F., GOODMAN, R. N., AND GOLDBERG, H. S.

Post-harvest treatment to control strawberry fruit rot.

Plant Dis. Reptr., 1958, **42**: 1066-8, bibl. 2, illus.

Ripe Dixieland and Blakemore strawberries were sprayed with a suspension of *Botrytis cinerea* and 4 hours later were dipped in solutions of 8 antibiotics and 1 fungicide (captan). Dry and water-dipped controls were provided. The fruit from all treatments was dried for 2 hours, then sprayed with a spore suspension of *Rhizopus stolonifer* (*R. nigricans*), air-dried, packed in quart boxes and stored at 21° C. After 72 hours' storage the least decay, which was due mainly to *Rhizopus*, was shown by the dry controls. Among the wet treatments the least decay followed the use of cycloheximide and oligomycin. In general, the Dixieland strawberries kept better than the Blakemore.—Univ. Mo., Columbia.

266. STURGESS, O. W.

A ripe fruit rot of the strawberry caused by a species of *Gloeosporium*.

Qd J. agric. Sci., 1957, **14**: 241-51, bibl. 7, illus.

A new species of *Gloeosporium* is described. The late season fruit produced for the jam factory is chiefly affected, and losses of up to 44% in some pickings have been experienced. Mean daily temperatures above 65° F. increase the incidence of the disease, particularly when these are associated with several days of rainy weather; but rainfall without suitable temperature conditions does not cause an outbreak. J.R.L.

267. WILHELM, S., AND STORKAN, R. C.

Soil fumigation with chloropicrin.

West. Fruit Gr., 1958, **12**(10): 11-13, illus.

This practice, used for the control of *Verticillium*

wilt of strawberries, is reviewed. Either 480 lb./acre is applied followed by water sprinkling and rolling to provide a seal, or 320 lb./acre, the land then being covered with polyethylene sheeting for 24 hours.

268. SCHMIDLE, A.

Ein Zweigsterben der Johannisbeere verursacht durch *Botrytis cinerea* Pers. ex Fr. (A dieback of currants caused by *Botrytis cinerea*.) [English summary 13 lines.]

Phytopath. Z., 1958, **33**: 117-26, bibl. 26, illus.

The symptoms of a die-back of red currants are described. The fungi isolated in 1955 to 1957 from dying twigs consisted of 62% *Botrytis cinerea* and 20% *Nectria cinnabarina*. Infection experiments were carried out to determine the annual periodicity of susceptibility to *Botrytis cinerea*. The plants proved to be particularly susceptible from October to April, that is from the beginning of dormancy until after flowering. In May inoculations led to death of the shoots only in a small percentage of cases, and most of the infections remained localized. The greatest resistance was attained at the beginning of fruit maturity and was retained until about the middle of August. [From author's summary.]—Inst. Obstkranh., Heidelberg.

269. NELSON, K. E.

Some studies of the action of sulfur dioxide in the control of botrytis rot of Tokay grapes.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 183-9, bibl. 12.

After infection of mature fruits by *Botrytis cinerea*, fumigation with 1% SO₂ for 45 min. did not affect the pathogen. The fungus was not eradicated from intact grapes fumigated for 8 hours with 1–0.7% SO₂. A fungistatic effect of the gas was found to be proportional to the length of the exposure period. A 20 min. exposure eradicated the fungus from some open lesions. The free and total SO₂ content of berries with open lesions was higher than that of intact berries; in all berries the relative amounts of free to fixed SO₂ were higher 1–2 hours after fumigation than 24–30 hours later. The rate of spread of botrytis in storage was not appreciably reduced by weekly fumigation periods longer than 10 min. with 0.25% SO₂.—Univ. Calif., Davis.

270. HARTMAIR, V., AND HÖI.ZL, H.

Zur Botrytis-Bekämpfung an Rebveredlungen durch B500. (Control of *Botrytis* in vine grafts by B500.) [English, French and Spanish summaries 4 or 5 lines each.]

Mitt. Klosterneuburg, Ser. A, 1958, **8**: 254-6, bibl. 5.

The average incidence of *Botrytis cinerea* infection in artificially inoculated grafts was 43% while in grafts inoculated and treated with B500 [an

oxyquinoline derivative] *Botrytis* occurred in 1.8% only.

271. NELSON, K. E., AND EUKEL, W. E.

The fungistatic effect of ionizing radiation on *Botrytis cinerea* in pure culture and in table grapes.

Abstr. in *Phytopathology*, 1958, 48: 396.

Mycelial transfers of *B. cinerea* on grape juice agar were irradiated with different dosages of ionizing radiation (electrons), then held at 36–38° F. A dosage of 1×10^5 rep delayed growth 5–7 days; 2×10^5 delayed growth 10–14 days; 4×10^5 resulted in slight growth, which stopped; and 8×10^5 resulted in no subsequent growth of the fungus. Cultures irradiated with 4×10^5 made no growth after transfer to unirradiated media. The rate of spread of botrytis rot among grape berries was markedly reduced with dosages up to 2×10^5 rep. No injurious effects were observed on fresh-harvested grapes irradiated with 2×10^5 rep.

272. PRŮŠOVA, H., AND ZEMÁNEK, J.

Výsledky pokusů s organickými fungicidy proti peronospoře révy vinné. (Results of experiments with organic fungicides used against downy mildew on vines.) [English and Russian summaries $\frac{1}{2}$ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 473–92, bibl. 3, illus.

This work on the control of *Plasmopara viticola* was carried out during 1953–1956 at several places. In 1953 the copper-containing fungicides bordeaux and Kuprikol were the most effective, followed by the dithiocarbamates ziram, ferbam and marbam in that order. Zineb tested for the first time in 1954 was as good as or better than Kuprikol either alone or in a spray schedule with the latter. Ziram was unsatisfactory. Similar results were obtained in 1955, except that 1% ziram was effective at one place. In a semi-commercial trial in 1956 Novozir (ziram) was equal to Kuprikol and had a stimulating effect on plant growth and fruit maturity.

273. SAVIN, G.

Cercetări și observații la stațiunea de avertizarea manei—Valea Călugărească. (Research and observations on downy mildew control [on vines].) [English, French, Russian and German summaries 1 p. each.]

Grăd. Via Liv., 1958, 7(6): 52–7 + summaries.

Some of the results of 22 years' work at the Valea Călugărească Station for downy mildew prevention are discussed. Primary infection nearly always occurred in May. The number of preventive treatments recommended varied from one to six, and 0.75–1% bordeaux was invariably effective. Infection was earlier and more severe in vineyards in valleys than on hillsides.

274. HAHN, H.

Bekämpfung des Roten Brenners durch Entseuchung des Bodens. (Control of *Pseudopeziza tracheiphila* on vine by soil sterilization.)

Vitis, 1958, 1: 286–7, bibl. 3.

The uniform application of calcium cyanamide (up to 400 kg./ha.) is recommended to destroy the apothecia of *Pseudopeziza tracheiphila* on last year's leaves on the ground. The best times for the treatment are either the spring, after which no soil cultivation should be carried out until the first treatment against *Peronospora*, or the autumn before ploughing.—BundesforschAnst. f. Rebenzücht. Geilweilerhof.

275. PRATELLA, G. C.

Il "mal dello stacco" del nocciolo. (Bark peeling disease of hazel.)

Inf. fitopat., 1958, 8: 182, illus.

The only control measures at present practicable against this fungus disease (*Cytospora corylicola*) are removal and burning of affected trees or branches, and winter spraying with copper fungicides containing sticker substances. [See also *H.A.*, 23: 420.]

276. LARGE, J. R.

Control of scab and foliage diseases of pecan.

A.R. Fla agric. Exp. Stats, 1956–57, p. 126.

The 3 best fungicidal treatments for scab control on Mahan trees were: 1. P.A.S. (tris(2 hydroxyethyl)(phenyl mercuri) ammonium lactate) and Glyodin plus lime, applied as a dormant spray of P.A.S., followed by 5 applications of P.A.S. plus glyodin plus lime; 2. P.A.S. and bordeaux-ziram, applied as a dormant spray of P.A.S., followed by 5 applications of P.A.S., with bordeaux in the first and second sprays, and ziram plus $\frac{1}{4}$ % summer oil in the third and fifth sprays; 3. P.A.S. applied as a dormant spray followed by 5 applications of P.A.S. during the summer. The best yield per tree (28.8 lb.) was obtained with regular bordeaux mixture, which was rated fifth for scab control (77.4%).

Nematodes.

(See also 312a.)

277. MILLER, P. M.

How growers can determine their own nematode problems.

Plant. Dis. Repr., 1958, 42: 1194.

A method is briefly described, in which soil samples from a field to be tested are mixed and placed in two flats [seed boxes]. The soil in one flat is treated with DCP (dibromo-chloropropane) and that in the other flat left untreated. Seeds or seedlings of tomatoes, okra or cucurbits or cuttings of woody plants are immediately placed in the two flats. If 8 weeks later, or longer in the case

of woody plants, there is a difference in vigour in favour of the treated flats, this indicates that a nematode problem exists in the field from which the soil was taken.—Conn. agric. Exp. Stat., New Haven.

278. FOSTER, H. H., AND COHOON, D. F.

Post-plant fumigation for the control of peach root-knot in South Carolina.

From abstr. in *Phytopathology*, 1958, **48**: 342. Applications of liquid Nemagon at 8 gal. active ingredient per acre gave excellent control of *Meloidogyne* spp. in newly established peach orchards. Granular Nemagon was less effective. Recent data indicate that Nemagon may be effective for at least 2 years after fumigation.

279. TOWNSHEND, J. L.

The effect of *Pratylenchus penetrans* on a clone of *Fragaria vesca*.

Canad. J. Bot., 1958, **36**: 683-5, bibl. 5, illus. Inoculation of the roots of *Fragaria vesca* with small numbers of *P. penetrans* resulted in significant reductions in petiole number and length and in fresh weight as compared with control plants. This suggests that *P. penetrans* may be an important primary parasite in the strawberry root-rot complex.—Bot. Plant Path. Div., Sci. Serv., Canada Dep. Agric., Ottawa.

280. MILLER, P. M.

Fumigation when transplanting nursery stock.
Plant Dis. Repr., 1958, **42**: 1178.

When trees are planted out, the application of a nematocide to the planting hole will prevent the spread of nematodes from infested roots for long enough to permit the establishment of a satisfactory primary root system. In trials to determine phytotoxicity an oil can was used to eject 2.2 ml. of a mixture consisting of 1 part 50% e.c. of DCP (dibromo-chloropropane) to 9 parts water (i.e. 0.11 ml. actual DCP) for each estimated cubic foot of planting hole or for each 1-ft. interval around a tree already planted. The trees tested included apples, pears, peaches, plums, and several broadleaved and coniferous ornamentals. None showed signs of injury.—Conn. agric. Exp. Stat., New Haven.

Mites.

(See also 311d, p, q, t, 312 l.)

281. HINTZ, H. W.

Studies on the European red mite on apple in Ohio.

Diss. Abstr., 1958, **18**: 1542-4, being *Publ.* 25,448 of 213 pp.

Eighteen insecticides and acaricides were tested for ovicidal activity, and, in general, showed the same relative effectiveness against eggs that they showed against mite populations in the field. Winter eggs

sprayed 11 days before the spring hatch began, required many times the concentration used against summer eggs for an equal kill. Various organic phosphates and sulphonates were most effective as ovicides. Parathion was erratic in action and was more toxic to eggs 5-7 days old than to those 1-3 days old.—Ohio St. Univ.

282. RODRIGUEZ, J. G.

The comparative NPK nutrition of *Panonychus ulmi* (Koch) and *Tetranychus telarius* (L.) on apple trees.

J. econ. Ent., 1958, **51**: 369-73, bibl. 18.

Apple trees were grown in nutrient culture in the greenhouse on 3 levels of N and P and one level of K supply during 2 seasons. Females of *Panonychus ulmi* and *Tetranychus telarius* were cultured on leaves detached from the trees and the resulting progeny were counted. Increasing N in the nutrient solution from 20 to 200 p.p.m. effected significant increases in both mite species. Increasing N to 800 p.p.m. elicited a further increase from *T. telarius* during one season. Populations of both species were positively related to absorbed N, but only *T. telarius* was significantly correlated. Absorbed N in apple foliage was negatively correlated with *T. telarius* population when P supply was increased. A tendency appeared for absorbed P to be positively correlated with *T. telarius* below 0.20% P and negatively correlated when higher percentages were reached in the foliage. *T. telarius* is found to react with more sensitivity and less variability than *P. ulmi* to changes in element supply and absorption. It was shown that *T. telarius* populations developed more rapidly than *P. ulmi* under the same conditions. *T. telarius* appears to react favourably to wider ranges of N absorption, and it follows that it would be capable of doing further damage to foliage after some bronzing by *P. ulmi* has occurred. [From author's abstract.]—Univ. Ky, Lexington.

283. BERKER, J.

Die natürlichen Feinde der Tetranychiden. (Natural enemies of tetranychid mites.)
[English summary $\frac{3}{4}$ p.]

Z. angew. Ent., 1958, **43**: 115-72, bibl. 85, illus.

Fifty-nine arthropod species were found to be predatory on 5 species of fruit tree spider mite (*Metatetranychus ulmi*, *Bryobia praetiosa*, *Tetranychus urticae*, *T. viennensis*, *Eotetranychus pomii*) and 2 species from *Salix* sp. (*Schizotetranychus schizopus*) and *Tilia* sp. (*Eotetranychus telarius*). In a small test with 4 trees which were covered with gauze and/or sprayed with DDT in early June, the highest number of predators was counted on the unsprayed, unprotected tree and the lowest number on the sprayed, protected tree. The high number of predators was associated with a reduction in mite numbers, a decrease in the number of

winter eggs laid, and a high proportion of attacked winter eggs. The number of predatory species was higher in neglected orchards than in orchards sprayed with insecticides, especially DDT or parathion.—Inst. PflSchutz, landw. Hochsch., Stuttgart-Hohenheim.

284. KRIEGLER, P. J., AND MYBURGH, A. C.

New spray programme makes pear bud mite a problem once more.

Fmg S. Afr., 1958, 34(7): 20-2, illus.

The use of organic fungicides instead of sulphur sprays has resulted in increased infestation of pear bud mite (*Eriophyes pyri*). Wettable S is recommended for control, and may be used in the codling moth spray programme.—W.P. Fruit Res. Stat., Stellenbosch.

285. GILMER, R. M., AND McEWEN, F. L.

Chlorotic fleck, an eriophyid mite injury of myrobalan plum.

J. econ. Ent., 1958, 51: 335-7, bibl. 5, illus.

Chlorotic fleck, a foliage abnormality of myrobalan plum (*Prunus cerasifera* Ehrh.), is induced by feeding of a toxicogenic eriophyid mite, *Vasates fockeui* (Nal. & Trt.). Although leaves of all ages are readily infested by the mites, symptoms of chlorotic fleck result only when the mites feed on immature leaves. Approximately 14 days elapse between the establishment of a mite infestation and the initial appearance of symptoms. Graft inoculations indicate that a virus is not involved. Excellent mite control and concomitant prevention of chlorotic fleck symptoms were obtained under field conditions with 3 applications of demeton, applied at approximately 2-week intervals. [Authors' abstract.]—N.Y. St. agric. Exp. Stat., Geneva.

286. BALDIT, G. L.

Amiton—a new acaricide and scalcicide.

J. Sci. Food Agric., 1958, 9: 516-24, bibl. 8.

Data collected on the chemistry, biological activity, toxicology and residues of amiton (OO-diethyl S-2-diethylaminoethyl phosphorothiolate) and its salts are presented in some detail. In extensive trials on apples in the U.K. in 1957 a single application of amiton oxalate at 2 oz./acre made at the fruitlet stage gave complete control of red spider mite (*Metatetranychus* [*Panonychus*] *ulmi*) throughout the season, and, so it would appear, throughout 1958 as well. By contrast, the standard acaricides chlorfenson, chlorbenside and methyl demeton failed to prevent the population of mites from building up in the late summer. Similar striking results have been obtained with amiton oxalate against *P. ulmi* on apples in the U.S.A. and against *Tetranychus telarius* on pears and *Bryobia praetiosa* on apples in South Africa. Tabulated results of trials in commercial citrus groves in Texas, South Africa and Cyprus have also shown it to be highly

effective against 3 mite species and 10 scale species. Residues found on apples have amounted to about 0.04 p.p.m. when the fruit was sprayed 2½–3 months earlier at the fruitlet stage. On citrus treated with amiton oxalate at 3 oz./acre residues fell to below 0.01 p.p.m. within 60 days.—Plant Protection Ltd., Yalding, Kent.

287. FERGUSON, W. C.

Tedion, an outstanding new acaricide.

J. econ. Ent., 1958, 51: 352-4.

Results of field tests have shown Tedion, 2,4,5,4'-tetrachlorodiphenyl sulphone, to be effective as an ovicide-larvicide in the control of various mite species on citrus, deciduous fruits and ornamentals without causing any apparent crop injury.—Niagara chem. Div., Middleport, N.Y.

288. DICKINSON, B. C.

Ethion, a promising new acaricide and insecticide.

J. econ. Ent., 1958, 51: 354-7.

Results of 2 years' field trials on apples have shown that ethion (Niagara 1240), O,O,O',O'-tetraethyl S,S'-methylene diphosphorodithioate, was effective against 2 species of aphids, 2 species of foliage mites and codling moth. A spray of 2 lb. of 25% w.p. per 100 gal., applied when the trees were either in the dormant or delayed dormant stage, gave good control of apple grain aphid, *Rhopalosiphum fitchii*, and rosy apple aphid, *Anuraphis roseus*. A 1-lb. rate applied in the pre-pink or early post-bloom period provided control of European red mite, *Panonychus ulmi*, and when applied in mid-season controlled 2-spotted spider mite, *Tetranychus telarius*. The use of ethion at the 2-lb. rate in all post-bloom sprays was as effective against codling moth, *Carpocapsa pomonella*, as DDT, lead arsenate or parathion.—Niagara chem. Div., Middleport, N.Y.

Insect pests.

(See also 311a, k, s, v, w, y, z, 312b, d, i, m, 817-820.)

289. HUKUSIMA, S.

The effect of various nitrogen levels upon the arthropod fauna of young apple trees, with special reference to the increase of mite and aphid populations. [English, with Japanese summary 1 p.]

Bull. Fac. Agric. Hirosaki Univ., 1958, No. 4, pp. 72-9, bibl. 12.

Tests on 3-year-old Jonathan apple trees grown in water culture solutions showed that different levels of N did not significantly affect the composition of the faunal population, but that the total insect and mite population was greater on the trees receiving high N than on those that were N deficient. The fecundity of *Panonychus ulmi* increased more on the trees receiving N than on those receiving none,

but that of *Tetranychus telarius* and of *Myzus malisuctus* increased more on the N deficient trees.

290. SCHNEIDER, H.

Untersuchungen über den Einfluss neuzeitlicher Insektizide und Fungizide auf die Blutlauszehrwespe (*Aphelinus mali* Hald.). (Studies on the effect of new insecticides and fungicides on *Aphelinus mali*.)

Z. angew. Ent., 1958, 43: 173-96, bibl. 54.

In the Palatinate, *Aphelinus mali* (parasitising woolly aphid) generally overwinters as a mature larva in diapause, but it may overwinter as a pupa or adult ready to emerge. Winter sprays of DNC or DNBP did not affect winter stages of the parasite. Fruit-tree carbolineum heavy oils, alone or in combination with DNC and mineral oils, and mineral oils alone killed the pupal stages, but did not affect diapause stages. Summer sprays of lead arsenate were not toxic to the parasite, and at normal concentrations of lindane, DDT, organophosphorus compounds, metasystox and toxaphene the host (woolly aphid), but not the parasite, was killed. Fungicide materials based on zineb, thiuram, captan and copper oxychloride had no effect on *Aphelinus mali* at normal concentrations. Wettable S sprays were only slightly toxic to adults. —Lehr- u. Forschungsanst. Wein-u. Gartenb., Neustadt.

291. EVENHUIS, H. H.

Over de invloed van de winter op de parasitering van de appelbloedluis, *Eriosoma lanigerum*, door haar parasiet *Aphelinus mali*. (The effect of winter conditions on parasitism of woolly aphid by *Aphelinus mali*.) [English summary ¼ p.]

Tijdschr. PlZiekt., 1958, 64: 328-32, bibl. 6.

After a severe frost in February there was a high mortality of woolly aphids, and by the following autumn there was a low rate of parasitism. This low rate continued over the following mild winter until the summer, when the rate of parasitism recovered, reaching 68% by September. [For earlier work see H.A., 28: 2406.]—Inst. PlZiekten-Onderz., Wageningen.

292. PRINCIPI, M. M.

La selettività negli insetticidi sistemici. Ripercussioni dei trattamenti con Systox e Metasystox sugli insetti utili. (Selectivity in systemic insecticides. Repercussions of treatments with Systox and Metasystox on useful insects.)

Frutticoltura, 1958, 20: 385-90.

Insect populations on apple and peach branches treated with Systox and Metasystox were compared with those on protected branches of the same trees. The insecticides gave complete control of *Eriosoma lanigerum*, *Aphis pomi* and *Hyalopteris pruni* where

contact action occurred, but the systemic action lasted only 4-5 days. Larvae of *Chrysopa* spp. were resistant to the contact action, but coccinellid beetles in various phases and eggs and larvae of syrphid flies were highly susceptible. Some cecidomyid larvae survived, as did those of *Leucopis* spp. which were inside their hosts, but the adult parasites were killed by contact action.

293. MAY, A. W. S.

Fruit fly control in deciduous orchards.

Qd agric. J., 1958, 84: 493-6, illus.

The damage caused by the Queensland (*Strumeta tryoni*), Jarvis' (*Afrodacus jarvisi*) and Perkins' (*S. humeralis*) fruit flies is described. Control may be obtained by spraying 0.2% DDT at the first indication of fly activity. Lure traps in trees carrying susceptible crops indicate when spraying should be done and the need for any subsequent spraying.

294. ŠEDIVÝ, J., KODYS, F., AND HOSTOUNSKÝ, Z. Příspěvek k poznání škodlivosti a ochrany proti obaleči jablečnému (*Enarmonia pomonella* L.). (The damage caused by and control of codling moth.) [English, Russian and German summaries ½ p. each.] Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 411-20, bibl. 9, illus.

Rates of codling moth infestation and mechanical control in an untended apple orchard are discussed. By using corrugated trapbands on tree trunks and regularly gathering fallen fruit, 89.9-100% of the caterpillars were destroyed. No decrease in worminess after mechanical treatment was, however, observed. When fallen or harvested fruit must remain temporarily heaped in the orchard, placing a trapbanded wooden pole in the middle of the heaps or surrounding the heaps with planks holding corrugated traps is recommended, resulting in the destruction of about 90% of the caterpillars leaving the apples.

295. MARSHALL, J.

Sevin—a new weapon for codling moth control.

West. Fruit Gr., 1958, 12(8): 23, illus.

New weapon against codling moth.

Grower, 1958, 50: 465.

Sevin gave better control than DDT of codling moth, green aphids, woolly aphids and eye-spotted bud moth on apples in B.C.

296. ASQUITH, D.

Spray combinations for control of the codling moth and the red-banded leaf roller on apple.

J. econ. Ent., 1958, 51: 378-9.

Ten insecticide treatments were tested on apple in combination with the fungicides captan and glyodine, respectively, against codling moth, *Carpo-*

capsa pomonella, and red-banded leaf roller, *Argyrotaenia velutinana*. With both fungicides Guthion and Sevin gave the best control of both insects. In most cases glyodine-insecticide combinations were better than captan-insecticide combinations; glyodine tended to improve the performance of the less effective insecticides to a greater degree than that of the more effective materials.—Pa St. Univ. Fruit Res. Lab., Arendtsville.

297. ALLEN, H. W.

The oriental fruit moth.

Agric. Inf. Bull. U.S. Dep. Agric. **182**, 1958, pp. 28, bibl. 47, illus.

In this review an account is given of the distribution, means of spread and life history of the moth and of the injury it causes to twigs and fruits. Its economic importance on peaches, quinces and apples is assessed, and its natural control by parasites, predators and the weather is discussed. Measures that have reduced infestations include the application of parathion, EPN and DDT sprays, and the liberation of the parasite *Macrocentrus ancylivorus*. Certain orchard sanitary measures also help to reduce the moth population.

298. JANSSEN, M.

Über Biologie, Massenwechsel und Bekämpfung von *Adoxophyes orana* Fischer von Roeslerstamm. (**Biology, trends in population and control of *Adoxophyes orana*.**) [English and Russian summaries 6–7 lines each.]

Beitr. Ent., 1958, **8**: 291–324, bibl. 52, illus.

In studies of biological control there was widespread but variable evidence of attack by a polyhedral virus. Parasitisation of the egg by *Trichogramma* sp. was 70% in one orchard, but other parasites are less important. Predators are probably only important in gardens. For chemical control, DDT, organo-phosphorus materials and lindane are recommended for spring application. Successful sprays for the over-wintering stage in a nursery were 0.4% lead arsenate (giving 70% control), 0.035 parathion (78%), 0.2% active-Gesarol 50 (92%) and 0.2% Gesarol 50 (95%).

299. FERNÁNDEZ, R., AND SANTA CRUZ, S.

Grave peligro para la exportación de uvas. Plaga de la polilla de la uva (*Eulia* sp.) ataca otras frutas. (**Serious threat to grape export. The grape moth pest (*Eulia* sp.) attacks other fruits.**)

Agric. Ganad., Chile, 1957, **3**(8): 9.

The larvae attack grapes, plums, peaches and apricots. For control in stone fruits, spraying with methoxychlor or DDD at 250–400 g./100 l. in November and January is recommended in Chile. Vines need a third treatment, in February, but in no case should spray be applied within 2–3 weeks of harvesting.

300. SAVARY, A., AND BAGGIOLINI, M.

La lutte contre la pyrale de la vigne (*Sparganthis pilleriana* Schiff.) dans les cultures de fraises. (**Control of the vine pyralid moth in strawberries.**)

Rev. romande Agric. Vitic., 1958, **14**: 81–3, bibl. 1, illus.

Pre-blossom application of parathion, diazinon, or a commercial product containing malathion and perthane gave satisfactory control of pyralid infestations in strawberries. Diazinon is recommended for commercial use.—Stat. féd. Ess. agric., Lausanne.

301. PHILLIPS, A. M.

Control of hickory shuckworm on pecans.

A.R. Fla agric. Exp. Stats 1956–57, p. 89.

When 95% of the nuts were infested, 3 applications of EPN at fortnightly intervals gave fair control of shuckworm [*Laspeyresia caryana*] on Mahan pecans, and were more effective than Ryanacide-100 or Sevin. With only 20.1% infestation on unsprayed Moore trees, 2 late applications of EPN gave good control, while Trithion gave only fair control. Several parasitic species are listed. [For earlier work see *H.A.*, 28: 313.]

302. MICHELbacher, A. E., AND HITCHCOCK, S.

Induced increase of soft scale.

Calif. Agric., 1958, **12** (11): 13.

The determination of scale insect populations in experimental plots of walnut trees showed that the systemic insecticides demeton and schradan were associated with an increase in the scale problem, although they apparently exert a strong suppressing action on scale population. Highly destructive scale populations developed in experimental plots where demeton (plus a codling moth spray) was used to control walnut aphid. Schradan has a controlling effect on soft scale, but calico scale increases with the use of schradan. There was little controlling effect of schradan when it was applied to foliage that had hardened or where large scale populations were present.

303. VIELWERTH, V., MAREK, J., AND NETOPIL, F.

Účinek dinitroorthokresolových přípravků na štítenku zhoubnou (*Quadraspidiotus perniciosus* COMST.—červec San José). (**The effect of dinitroorthocresol preparations on San José scale.**) [English, Russian and German summaries ½ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 467–72, bibl. 8.

Laboratory, greenhouse and outdoor experiments were conducted on San José scale control on apples. The DNC preparations Nitrosan at 2% and Diflavin powder in 1% solutions gave very good control without damaging the trees. Similar preparations based on mineral oils were effective but phytotoxic. The effectiveness of DNC preparations was decreased by reduced humidity, but this is unlikely to occur during dormant spraying.

304. HILL, C. H.

The biology and control of the scurfy scale (*Chionaspis furfura* (Fitch)) on apples in Virginia.

Diss. Abstr., 1958, 18: 701-2, being *Publ.* 24,498 of 78 pp.

Paraffinic base oils were superior to naphthenic base oils, and gave satisfactory control when used in dormant or delayed dormant applications at 3%. Four ounces of parathion in 100 gal. applied at petal-fall gave excellent control. Metacide and Compound 4049 (Malathon) showed promise when used at relatively high concentrations. DDT was effective in killing "crawler" nymphs, but it did not reach all nymphs, and is therefore not considered entirely satisfactory.—Ohio St. Univ.

Other pests.

(See also 311r.)

305. TURLEY, R. H.

Note on a modified electric bird perch for protecting crops.

Canad. J. Plant Sci., 1958, 38: 374-6, bibl. 2, illus.

An electric bird-scaring apparatus is described which protected vegetable seed crops and other crops at the Experimental Farm, Saanichton, B.C., from the worst offenders: California purple finches, goldfinches and English sparrows. It was a modification of Pfeifer's apparatus [see *H.A.*, 26: 267li.]

306. GAUDCHAU, M. D.

Zur Frage der Wirksamkeit von Endrin und Toxaphen im Flächenbehandlungsverfahren gegen die Grosse Wühlmaus *Arvicola terrestris* (L.). (The effectiveness of endrin and toxaphene for control of *Arvicola terrestris* over a large area.) [English summary 13 lines.]

NachrBl. dtsh. PflSchDienst., Braunschweig, 1958, 10: 152-8, bibl. 22.

Toxaphene was not effective for water vole control in the test plots (including grassed apple orchards). Endrin applied at 400 g. active ingredient per hectare gave 77-89.3% mortality. Treatment during October and November was more successful than that during spring or summer.—Landesanst. PflSchutz, Stuttgart.

Sprays and spraying.

(See also 67, 311b, 312j.)

307. SOCIETY OF CHEMICAL INDUSTRY.

The comparison of high- and low-volume spraying techniques on fruit and ground crops.

Monogr. Soc. chem. Ind. Lond. 2, 1958, pp. 117, bibls, illus., 18s.

Eleven papers read at a symposium organized by

the Pesticides Group in 1956 are published, together with brief discussions on them. They include: Concentrate spraying—fungicidal aspects, by M. H. Moore; Orchard trials with undiluted lime-sulphur, by H. H. Glasscock; The development of low-volume spraying methods with special reference to fruit, by J. H. Stapley; Commercial value of various low-volume techniques used in fruit tree spraying, by D. Hunnam; Large-scale application of low-volume sprays, by K. G. Chandler; Levels and distribution of deposits, by J. T. Martin; Spray techniques for fruit, by H. G. H. Kearns; Droplet formation and assessment, by J. B. Byass; The development of air-assisted fruit-spraying machinery, by L. C. Pearch; and The application of low-volume spraying in East Africa, by A. E. H. Higgins.

308. MULLA, M. S., AND BARNES, M. M.

A twin-rotor broadcaster for the application of granulated insecticides.

J. econ. Ent., 1958, 51: 278-81, bibl. 9, illus.

This truck-mounted equipment may be adjusted to provide uniform deposits of the same material over various swath widths or to provide a range of swath widths with materials which vary greatly in particle density. [From authors' abstract.]—Univ. Calif. Citrus Exp. Stat., Riverside.

309. MARTIN, J. T., AND PICKARD, J. A.

Spray application problems: XLII. Mercury deposits on apple fruits and foliage.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 76-81, bibl. 4.

The mercury deposits on Bramley's Seedling apple leaves and fruits following 7 applications of phenylmercuric nitrate at 0.003% mercury, were followed throughout the season. Surface deposits were largely lost from leaves and fruits between each application, but some penetration of mercury into the leaves and fruits occurred. Sprayed fruits taken from store showed a mean level of contamination of mercury of 0.05 p.p.m., equivalent to 10 µg of mercury per apple of 200 g. weight. Of this amount, 2 µg occurred in the peel, 8 µg in the flesh and less than 1 µg in the core of the fruit. [From authors' summary.]

310. ANON.

Lotta antiparassitaria in viticoltura e frutticoltura. (Control of fungus diseases in viticulture and fruit growing.)

Inf. fitopat., 1958, 8: 154-64, illus.

The relative merits of 4 copper and 4 non-copper fungicides are discussed with reference to control of downy mildew. The main advantage of the copper products is that, in addition, they give protection from powdery mildew, against which the non-copper fungicides are useless (except for the slight action of maneb). Control of powdery mildew is generally effected by karathane in cool,

and sulphur in warmer weather, but treatment with either should be carried out before mean day temperatures rise above 20° C. Recent work on control of leaf curl and shot hole in peaches is reviewed, with particular reference to TMTD as an effective fungicide for both diseases.

Noted.

311.

a ANON.

Insect pest control for the home gardener.

[Publ.] *B.C. Dep. Agric.*, 1958, pp. 5.

Recommended sprays for vegetables, tree and small fruits, and flowers and shrubs.

b ARMAN, P., AND WAIN, R. L.

Studies upon the copper fungicides. X. The role of leaf exudates in the solution of copper from bordeaux mixture.

Ann. appl. Biol., 1958, **46**: 366-74, bibl. 11.

Studies on apple and dwarf bean leaves. [For part IX, see *H.A.*, 17: 741.]

c CANOVA, A.

La clorosi variegata primaverile della fragola. (June yellows in strawberries.)

Inf. fitopat., 1958, **8**: 176-7, illus.

In Auchincruive Climax and Madame Moutot.

d CHABOUSSOU, F.

État actuel de la lutte chimique contre les tétranyques nuisibles aux arbres fruitiers en Europe. (The present position of chemical control of injurious spider mites on fruit trees in Europe.)

Ann. Épiphyt., 1958, **9**: 77-93, bibl. 89.

A review.

e CROSSE, J. E., BENNETT, M., AND GARRETT C. M. E.

Fire-blight of pear in England.

Nature, 1958, **182**: 1530, bibl. 1.

A note on the first appearance of the disease and on symptoms and hosts.

f DUNIN, M. S., AND DEMENT'eva, M. I.

The dates for spraying vineyards against downy mildew. [Russian.]

Vinodelie i Vinogradarstvo, 1958, **18** (6): 35-41, bibl. 15.

A critical discussion considering climate, situation and varieties in addition to incubation periods and plant development.

g FALCHIERI, F.

Disinfezione delle serre in assenza di piante e del terreno. (Disinfection of glasshouses in the absence of plants, and soil disinfection in the open.)

Inf. fitopat., 1958, **8**: 180-1, illus.

A brief review of materials and methods.

h GROSCLAUDE, C., AND DELMAS, J.

Le plomb du pêcher dans le sud-ouest de la France. (Silver leaf of peaches in S.W. France.)

C.R. Acad. Agric. Fr., 1958, **44**: 633-5, bibl. 1.

Silver leaf appears to be spreading through root infection, particularly where intensive cultivation is practised. The factors involved are discussed.

i HEYNS, A. J.

Spray trial against curly leaf (*Taphrina deformans*).

Dec. Fruit Gr, 1958, **8**: 166.

Lime sulphur 32°B 1:20 applied when the buds had just started to swell gave the best control of peach leaf curl.—W.P. Fruit Res. Stat., Stellenbosch.

j HORN, N. L.

A field method of testing fungicides for the control of *Botrytis* rot of strawberries.

From abstr. in *Phytopathology*, 1958, **48**: 343.

Using a sprinkler system to maintain high moisture conditions. Results with 6 fungicides reported.

k HUKUSIMA, S.

The effect of sulphur sprays on the composition of arthropod communities in adult apple orchards. [Japanese, with English summary 2 pp.]

Bull. Fac. Agric. Hirosaki Univ., 1958, No. 4, pp. 55-71, bibl. 21.

The effects of lime sulphur on various insects and fruit tree red spider mites.

l KLEMM, K.

Über Versuche mit ¹⁴C zum Einbau von Karbonat—Kohlenstoff in organische Substanz von *Vitis vinifera*-Blättern. (Experiments with C¹⁴ on the incorporation of carbonate carbon in the organic substance of *Vitis vinifera* leaves.)

Vitis, 1958, **1**: 282-5, illus.

In connexion with breeding for resistance to *Pseudopeziza tracheiphila*.

m KOČENKO, Z. I.

Results of trials with 50% zinc ethylene bisdithiocarbamate for downy mildew control. [Russian.]

Vinodelie i Vinogradarstvo, 1958, **18** (7): 38-9.

Under conditions of these experiments zineb at 0.5% was better than 0.3 and 0.75% zineb or 1% bordeaux.

n KOCH, H.

Anerkannte Pflanzenschutzgeräte und -geräteile (Auszüge aus den Prüfungsberichten 1957) II. (Approved plant protection apparatus (abstracted from the test reports, 1957) II.)

- NachrBl. dtsh. PflSchDienst., Braunschweig*, 1958, **10**: 161-7, illus.
Low volume spraying machines, and oil heaters for frost protection. [For Part I see *H.A.*, 28: 3561y.]
- o LANE, J. R.
Determination of Phygon residues on food crops.
J. agric. Food Chem., 1958, **6**: 746-7, bibl. 9.
Based on a colour reaction with dimethylamine and applicable to fruits and vegetables.
- p LYON, F. D. (BECKENHAUER, R. W.).
Strawberry grower builds crown duster.
West. Fruit Gr., 1958, **12** (8): 25, illus.
To apply insecticides directly into strawberry crowns for control of cyclamen mite.
- q MACNAY, C. G., AND CREELMAN, I. S.
List of insects and mites affecting tree fruits in Canada.
Res. Notes Ser. Canada Dep. Agric. E-12, 1958, pp. 38.
Listed under each fruit with Latin and common names and geographical distribution.
- r MEHL, S.
Zweckmässige Bekämpfung der Schermaus (*Arvicola terrestris* L.) und des Maulwurfs (*Talpa europaea* L.) mit besonderer Berücksichtigung gemeindeweisen und flächenweisen Vorgehens in Mittel- und Süddeutschland. (The control of voles and moles by parishes and districts in central and southern Germany.)
[English summary 31 lines.]
NachrBl. dtsh. PflSchDienst., Braunschweig, 1958, **10**: 134-40, bibl. 74, illus.
Chemicals, CO gas and traps discussed.
- s MICHELBACHER, A. E., AND ORTEGA, J. C.
A technical study of insects and related pests attacking walnuts.
Bull. Calif. agric. Exp. Stat. **764**, 1958, pp. 86, bibl. 113, illus.
Life histories, damage and control of insects and mites in the field and in storage.
- t MINISTRY OF AGRICULTURE, LONDON.
Red spider mite on hops and other crops in the open.
Adv. Leaflet. Minist. Agric. Lond. **226**, revised 1958, pp. 4.
Tetranychus telarius on hops, strawberries, black currants, violets and beans.
- u MINISTRY OF AGRICULTURE, LONDON.
Diseases and pests on horticultural planting material. A guide to their recognition.
[Publ.] *Minist. Agric. Lond.*, 2nd edition 1958, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 38, illus., 7s. 6d.
A handbook for export and import inspectors, revised. [For 1st edition see *H.A.*, 24: 1296.]
- v MOSEBACH, E.
Ermittlung des Wirkungsgrades von Pflanzenschutzmitteln mit Hilfe einer graphischen Methode. (The determination of the efficiency of plant protection materials with the help of graphs.)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1958, **10**: 170-1, bibl. 2.
A mathematical method based on pest mortality developed for use in the field.
- w MYBURGH, A. C.
Is the codling moth becoming resistant to DDT?
Fmg S. Afr., 1958, **34** (6): 42-3, illus.
Promising control with Sevin and Gutathion.
- x NIRVAN, R. S. -
Control for fruit rot of pomegranate.
Sci. and Cult., 1957, **22**: 395-6, bibl. 5, illus.
A dry rot starting on the leaves and moving to the fruit caused by *Phomopsis* sp. is described. Damage was greatly reduced by 3 sprayings at 10-day intervals of $\frac{1}{2}\%$ perenox plus a sticker [in this case albolium].
- y N.S.W. DEPARTMENT OF AGRICULTURE, ENTOMOLOGICAL BRANCH.
Tree borers.
Agric. Gaz. N.S.W., 1958, **69**: 252-8, illus.
And their control on fig and other orchard trees.
- z OATMAN, E. R.
Variegated cutworm injury to ripe strawberries.
J. econ. Ent., 1958, **51**: 410-11, illus.
Peridroma margaritosa was not controlled in the field by malathion at 1 lb./ac., nor in the laboratory by 1% rotenone dust.—Univ. Wis., Madison.
312.
a PITCHER, R. S., AND CROSSE, J. E.
Studies in the relationship of eelworms and bacteria to certain plant diseases. II. Further analysis of the strawberry cauliflower disease complex. [German summary 16 lines.]
Nematologica, 1958, **3**: 244-56, bibl. 12, illus.
The roles of *Aphelenchoides ritzeana-bosi* and *Corynebacterium fascians* in the etiology of the disease.
- b PRINCIPI, M. M.
Problemi fitosanitari della frutticoltura. (Pest control problems in fruit growing.)
[French, English and German summaries 13, 12 and 10 lines respectively.]
Frutticoltura, 1958, **20**: 329-37.
A review of recent work on the multiplication of certain pests resulting from destruction of their competitors and natural enemies by insecticides.

- c REINHARDT, J. F.
The effect of sub-freezing temperatures on the viability and pathogenicity of the fire blight pathogen, *Erwinia amylovora* (Burrill) Winslow et al.
Diss. Abstr., 1958, **18**: 358, being *Publ.* 25,271 of 104 pp.
Possible reduction of potential inoculum by spring frosts.
- d ŠČERBAKOV, V. V.
Control of *Rhynchites auratus* on cherry [Russian.]
Sad i Ogorod, 1958, No. 7, p. 63.
With DDT sprays or dusts.
- e SITTERLY, W. R.
Physiological factors affecting the onset of susceptibility of apple fruit to rotting by *Botryosphaeria ribis* G. & D., *Glomerella cingulata* (Stonem) S. and VS., *Physalospora obtusa* (Schw.) Cooke, and *Neofabraea malicorticis* (Cordley) Jackson.
Diss. Abstr., 1958, **18**: 1957-8, being *Publ.* 24,405 of 104 pp.
Susceptibility related to carbohydrate levels.
- f SOUS-COMMISSION . . .
Protocole d'expérimentation des nouveaux produits fongicides recommandés dans la lutte contre le mildiou de la vigne. (Schedule of testing for new fungicidal products recommended for control of downy mildew in vines.)
Bull. Off. int. Vin, 1958, **31** (332): 4-5.
A list of the various types of data needed for valid comparison of fungicides.
- g SPIELMANN, G. J.
La protección contra heladas mediante el riego por aspersión. (Frost protection by sprinkler irrigation.)
Idia, 1958, No. 121, pp. 3-22, bibl. 17, illus.
Equipment, technique and economics, mainly for orchards, with brief reference to ornamentals.
- h TASMANIA, DEPARTMENT OF AGRICULTURE.
Winter sprays for control of black spot of apples.
Fruit World, Melbourne, 1958, **59**(6): 19, bibl. 2, illus.
Using DNOC or 0.1% phenyl mercury chloride.
- i THERAPEUTANT SPECIALIST, HORT. DIV., N.Z.
Toxic residues in crops treated.
Fruit and Prod., 1958, August, p. 8.
Toxic residues in crops—for human consumption or forage—treated with organo-phosphorous insecticides.
N.Z. Comm. Gr., 1958, **14** (2): 19.
Care with methyl demeton, schradan and amiton oxalate.
- j THOMPSON, C. C.
The efficiencies of wetting agents used in agricultural sprays.
J. Sci. Food Agric., 1958, **9**: 650-7, bibl. 12.
The ability of 8 chemicals to promote wetting of apple, pear and cabbage leaves.
- k TRZCINSKI, T.
Considérations sur le carence en potasse du pommier. (On potassium deficiency in apples.)
Fruit belge, 1958, **26**: 121-7, bibl. 12, illus.
A short review.
- l VAN DE VRIE, M.
Waarnemingen over de biologie en bestrijding van de aardbeemijt (*Tarsonemus pallidus* Banks) in productievelden. (Observations on the biology and control of the strawberry mite (*Tarsonemus pallidus*) in the field.) [English summary $\frac{1}{2}$ p.]
Reprinted from *Meded. Landbouwhogeschool Gent*, 1957, **22**: 471-80, bibl. 6, illus., as *Meded. Inst. plziekt. Onderz. Wageningen* **159**.
See *H.A.*, 28: 302 and 1267.
- m ZECH, E.
5 jährige Untersuchungen über den Schlupfverlauf von *Carpocapsa pomonella* L. mit besonderer Berücksichtigung der 2. Generation. (Five years' studies on the course of emergence of codling moth, with special reference to the second generation.) [English and Russian summaries 18 lines each.]
NachrBl. dtsh. PflSchDienst, Berlin, 1958, **12**: 143-50, bibl. 27.
On apples and pears at Naumburg, Saale.
- n DE ZEEUW, J.
Mogelijkheden van nachtvorstwering. (Possibilities of ground frost protection.) (English summary 14 lines.)
Meded. Dir. Tuinb., 1958, **21**: 430-3, illus.
Sprinkler irrigation has been the most successful method.
- o ZUBOV, M. F.
Zinc ethylene bisdithiocarbamate—a new effective fungicide against downy mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (7): 36-8.
For downy mildew control on vines 50% zineb at 0.5-0.75% proved as good or better than 1-4% bordeaux.

WEEDS AND WEED CONTROL.

Particular weeds.

313. LEE, W. O., AND TIMMONS, F. L.

Dodder and its control.

Fmrs' Bull. U.S. Dep. Agric. **2117**, 1958, pp. 20, illus.

The distribution of 6 species of dodder (*Cuscuta* spp.) in the United States, their biology, mode of spread, host plants and control on field crops are discussed. No method is known for controlling dodder in vegetables or flowers without killing the hosts. From woody ornamentals the parasite can be removed by hand. Glasshouse-, frame- or seed bed-soils infested with dodder seed should be either changed or fumigated with methyl bromide.

314. FORSTER, R.

Dalapon, no combate ao sapé (*Imperata brasiliensis* Trin.). (Dalapon for control of *Imperata brasiliensis*.) [English summary 9 lines.]

Bragantia, 1957, **16**(Suppl.): I-II.

Where the grass was sprayed in full growth, dalapon at 0.25-1 g. of active principle per sq. m. gave better control than where the plots had been mown 30 days before treatment. On both types of plot cutting 5-6 months after treatment further reduced the infestation, but only very slightly on those mown before spraying.

315. ANON.

Selective control of *Mikania* and rubber seedlings by spraying.

Plant. Bull. R.R.I.M., 1958, No. 38, pp. 113-14.

Mikania may be controlled by spraying fernoxone, 0.1%, with spot spraying repeated 3 or 4 months later. Self-sown rubber seedlings may be controlled, although the older seedlings are not eliminated, by spraying floroxone, $\frac{1}{2}$ pt. per 100 gal., at 6-monthly intervals.

316. HUNTER, J. A., AND OVER DE LINDEN, A. J.
-
- The oxalis problem. Growth characteristics and control of two species.**

N.Z. Gdnr., 1958, **15**: 23-9, 31, 33, illus.

In New Zealand *Oxalis pes caprae*, the yellow flowered oxalis, and *O. latifolia*, the pink flowered oxalis, are among the most troublesome weeds of nurseries and gardens. Complete control was obtained of both species on non-cropped land with 1 lb./sq. yd. sodium chlorate, two applications of $\frac{1}{8}$ oz./sq. yd. CMU or 3 oz./sq. yd. 2,4-D (80% a.i.). Residual toxic effects in the soil persisted for over 12 months. In commercial practice fumigation with methyl bromide is used successfully and Vapam was found to give similar results. For gradual control in home gardens an appropriate cropping plan and spraying with 2½% sodium chlorate plus

a wetter at the most vulnerable stage, i.e. 4-6 weeks after emergence, are recommended.

317. WESTMORELAND, W. G., AND GARRISS, H. R.
-
- How to control witchweed.**

Ext. Folder N.C. agric. Ext. Serv. **152**, 1958, 1 folded sheet, illus.

Spot infestations of *Striga asiatica* are best controlled with methyl bromide fumigation, and field infestations by growing either catch or trap crops and using 2,4-D. In tobacco and vegetables DNBP [dinoseb], applied very carefully, can be used to kill witchweed.

Particular herbicides.

(See also 380c, f, j.)

318. CRABTREE, G.

The influence of light on the activity of several herbicides.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 33-40, bibl. 14.

In field trials, shading (by muslin) was applied (1) from emergence, (2) from herbicide treatment, (3) from emergence until treatment, (4) from emergence until 2 days after treatment, (5) from treatment until 2 days later, (6) no shading. The chemicals and crops tested were 2,4-D (amine) in beans, CIPC in oats, dinoseb in radishes, and oil (Bayol D) in oats. Growth inhibition was used as the response criterion. With all 4 chemicals the author considers there was a tendency for herbicidal activity to be reduced when shading was applied before herbicide application and when shading was removed 2 days after treatment. Temperatures under the shades sometimes varied 10° F. from those in the open.—*Weed Abstr.*, **7**, No. 1556.

319. FEDDEMA, L.

The influence of depth of placement on herbicidal activity of monuron and simazin.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 41-4, bibl. 1.

Monuron 0.5 and 1 lb./ac. and simazin 2 lb./ac. were applied to an Ontario sandy loam at 0, 4, 8 and 12 in. depths and kidney beans, garden beets, cucumber, *Chenopodium album*, *Amaranthus retroflexus*, *Portulaca oleracea*, and *Taraxacum* sp. were sown in all plots. The only plants remaining 5 weeks after treatment were 80% of the beets and a scattering of *C. album* on the monuron 0.5 lb./ac. plots at 0 in. depth and 100% of *A. retroflexus* on the simazin at 4, 8 and 12 in. depth. The toxic effect of the simazin on the surviving *A. retroflexus* plants was inversely proportional to the depth of placement, i.e. plants on 12 in. depth plots were the largest when chlorosis appeared and had the

shortest inhibitory period. The differences in plant response and their possible relation to differing root systems are discussed.—*Weed Abstr.*, 7, No. 1450.

320. MAY, G. E., AND HARVEY, W. A.

Weeds controlled with cyanamid.

Calif. Agric., 1958, 12 (10): 7, 15, illus.

In winter crops of spinach and mustard 79% and 81% control of annual weeds was obtained by incorporating calcium cyanamide into the soil before sowing. The cyanamide was applied in bands along the seed rows at an overall rate of 1,500–2,000 lb. per acre, i.e. an actual application 500–666 lb. per acre to the band. Irrigation or rain is required within 2 days to activate the cyanamide.

321. McCARTY, C. D., PURNELL, D. C., AND GARBER, M. J.

New selective herbicide tested.

Calif. Agric., 1958, 12 (10): 8, 15, illus.

Spray applications of CDEC at rates between 0.6 lb. and 10 lb. per acre were given to 4 lettuce varieties, one day before sowing. Rates below 5 lb. per acre were ineffective. Weed growth was visibly reduced at rates between 5 and 10 lb., but complete control was not obtained even at the highest rate. There were initial symptoms of toxicity, but these had disappeared by maturity.

322. FORSTER, R.

O uso do C.M.U. como ervicida total.

(The use of CMU as a general herbicide.)

[English summary 10 lines.]

Bragantia, 1957, 16(Suppl.): xxvii–xxxI, bibl. 6.

A clay soil was cleared and maintained practically free of weeds (mainly grasses and nutgrass) for 2 years by one application of CMU, using 49 g. per l. of water for 9 sq. m. of soil.

323. SZABO, S. S.

Some of the effects of ionic additives on the physiological properties of 2,4-D.

Diss. Abstr., 1958, 18: 752-3, being *L.C.*

Card No. Mic 58-834 of 104 pp.

The toxic effects of 2,4-D for beans were increased by ammonium and phosphate additives and reduced by Cu, Fe, Zn, and a mixture of B, Cu, Mn, Fe plus Zn. Cell elongation was stimulated by Co added to solutions containing low concentrations of 2,4-D, and inhibited by Cu and Zn. At pH 5 ammonium and phosphate additives improved absorption and penetration of bean surfaces by 2,4-D, while Co, Cu, Mn and Zn inhibited these effects. Penetration of 2,4-D in *Sedum* epidermis was improved by ammonium and phosphate additives at pH 3 and 5. Penetration of 2,4-D was increased by all additives at all pH levels between 3 and 8 when a collodion membrane was used.—*Univ. Wisconsin*.

324. ASHTON, F. M.

Absorption and translocation of radioactive 2,4-D in sugarcane and bean plants.

Weeds, N. York, 1958, 6: 257-62, bibl. 26.

A highly sensitive method of determining radioactive 2,4-D in different plant tissues is described. The sugar cane plant absorbed 94.8% and the bean 83.0% of 2,4-D placed on their leaves. 2,4-D was translocated less in the sugar cane than in the bean plant, the treated leaves containing 93.5 and 23.0% respectively of the total 2,4-D present. The concentration of 2,4-D in the growing point of the bean was 10 times that in sugar cane.—*Weed Abstr.*, 7, No. 1778.

325. LEASURE, J. K.

A study of some bioassay methods for herbicide volatility.

Weeds, N. York, 1958, 6: 310-14, bibl. 7.

A comparison of tomato leaf epinasty, cucumber and mustard seed germination and cucumber root tests for measuring the relative volatility of 2,4-D formulations.—From *Weed Abstr.*, 7, No. 1770.

326. WAYWELL, C. G.

A report on Mylone used as a seed bed treatment on muck soil.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 365-7.

Mylone (3,5-dimethyltetrahydro-1,3,5,2H thiadiazine-2-thione, 85%) was applied at 100, 200 and 300 lb./ac. and the plots were cultivated, surface raked, and irrigated (by sprinkler) for 10 hours. Onion, cabbage, tomato and celery were sown 9, 14 and 17 days after treatment. Excellent control of weeds (*Portulaca oleracea*, *Chenopodium glaucum*, *C. album*, *Senecio vulgaris* and *Amaranthus retroflexus*) was obtained with all rates. The 2 higher rates caused a weight increase with onions and tomatoes but not with cabbage or celery. None of the treatments caused any stand reduction; cabbage from the first date of sowing showed slight temporary chlorosis but soon recovered. Onion smut was effectively controlled by the 200 and 300 lb./ac. rates and greatly reduced by 100 lb./ac.—*Weed Abstr.*, 7, No. 1464.

327. POULOS, P. L.

Neburon: newest of the substituted urea herbicides.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 45-9.

Neburon at 4 lb./ac. in 80 gal. water, applied to clean cultivated areas in the late autumn or early spring, is recommended for weed control in evergreen and deciduous ornamentals. About 1.5 in. of rainfall or irrigation is needed within 2 weeks of treatment. Among 28 ornamental species only azalea appeared susceptible to injury at this concentration. Neburon at 3.7 lb./ac. applied to transplanted Manaluci tomatoes, with

irrigation the next day, showed 95% weed control after 2 weeks and 98% 4 weeks later without injuring the crop. In strawberries neburon at 2.13 lb./ac. applied 1 day after planting gave 97.5% control of broad-leaved weeds 5 weeks later without causing crop injury. Control of grasses was, however, poor. In established strawberries treatments resulted in temporary chlorosis but excellent weed control.—From *Weed Abstr.*, 7, No. 1470.

328. BING, A.

Tolerance of some perennials and woody plants to Sesone (Crag No. 1) and chloro IPC.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 124-9, bibl. 7.

Susceptibility lists are given of a number of herbaceous perennial and woody nursery plants to 2,4-DES 4 and 6 lb./ac. and CIPC 4 and 8 lb./ac. (miscible and granular). Most plants tested showed tolerance to both herbicides.—*Weed Abstr.*, 7, No. 1475.

329. RICHARDS, R. F.

Simazin and related triazines—a progress report.

Proc. 11th annu. Mtg south. Weed Conf., 1958, pp. 86-9.

Simazin at 2-4 lb./ac. was harmless to brambles, established asparagus and roses, at 2-8 lb./ac. to gladioli and at 16 lb./ac. to vines. *Arbor vitae*, Pfitzer's juniper, yew, various pines, peach and apple were tolerant, and citrus appeared particularly resistant. Simazin has given promising results on aquatic weeds and algae. The related compounds showed good results in several vegetable crops.—From *Weed Abstr.*, 7, No. 1828.

330. THORNTON, B. J.

The use of soil sterilants in controlling perennial weeds.

Proc. 16th west. Weed Control Conf., 1958, pp. 97-8.

2,3,6-TBA was more effective when applied to weed foliage in the growing season than when applied to the soil in the autumn. At 5 lb./ac. it removed *Convolvulus arvensis* from bearing tomatoes without crop injury. Reductions obtained in 6 species by single foliage applications of 10 and 20 lb./ac. are given.—From *Weed Abstr.*, 7, No. 1540.

Control of aquatic weeds.

(See also 380d, e, o.)

331. ADAMSON, R. M., AND OTHERS.

Aquatic weeds.

Res. Rep. nat. Weed Cttee, west. Sect., 1957, pp. 73-4.

Against waterlilies [*Nuphar* spp.] 2,4,5-T 4 lb./ac. +

dalapon 12 lb./ac. was more promising than 2,4-D ± 2,4,5-T or ± amino triazole or ± dalapon. Spring applications of 2,4-D appeared more effective on *Juncus effusus* than autumn applications. Dalapon at 20 lb./ac. gave almost complete control of bullrush [*Scirpus* spp.] and was more effective than amino triazole at 6 lb./ac. Amino triazole at 8 lb./ac. gave 95% control of *Polygonum hydropiper* and *P. persicaria*—From *Weed Abstr.*, 7, No. 1928.

332. DARDEN, W. M., AND TALBOTT, D. R.

A new mechanical technique for controlling aquatic vegetation.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 344-5.

The machine described is a motor driven water pump connected to a manifold, which is connected to rotatable batteries of jets. The apparatus may be mounted on a small boat, on a pontoon barge, or on a dolly attached to the body of a truck. The jets are directed at the roots of the weeds which when dislodged are then raked in with an attachment. Water pressure from the jets is adjustable, and the jets are the motive power of the barge which may be moved in any direction.—*Weed Abstr.*, 7, No. 1507.

333. SAHA, K. C., SEN, D. P., AND MUHURY, G. N.

On the destruction of water-hyacinth (*Eichhornia crassipes* Solms) by 2,4-D.

Sci. and Cult., 1958, 23: 556.

A 0.2% solution of 80-82% sodium salt of 2,4-D was sprayed twice from a power sprayer. A total of 3 lb. 12 oz. of chemical per acre was needed. The plants were destroyed in about 10 weeks and the whole operation cost about Rs. 30 per acre.—Directorate of Fisheries, W. Bengal.

Weed control in fruit crops.

(See also 74, 178, 218, 370, 379, 380b, h.)

334. WEZENBERG, J.

Bestrijding van kweekgras met Dalapon (Control of couch grass with dalapon.)

Fruittteelt, 1958, 48: 803.

Dalapon at 10 kg. per ha gave effective control of *Agropyron repens* in plantations of Golden Delicious on M.II, M.IV and M.IX, and of Jonathan on M.II, when applied at the beginning of June.

335. LUCKWILL, L. C., AND CAMPBELL, A. I.

The control of bindweed in black currants.

A.R. Long Ashton agric. hort. Res. Stat. for 1957, 1958, pp. 68-71, bibl. 2.

Four field trials are described in which the potassium salt of 2:4:5-trichlorophenoxybutyric acid (2:4:5-TB) was used as a herbicide for the control of field bindweed (*Convolvulus arvensis* L.) and greater bindweed (*Calystegia sepium* L.) in black

currants. Good control of both bindweed species was obtained by the application of this compound at 1,000 p.p.m. using 300 gallons per acre, shortly after the crop had been harvested. Black currants are more tolerant of 2:4:5-TB than of MCPB, and at the rates of application used no damage was caused to a wide range of commercial varieties. [Authors' summary.]

336. TREVETT, M. F.

Grass control in lowbush blueberry fields with dalapon.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 374-82.

Dalapon (sodium) 1.6-6.4 lb./ac., applied pre-emergence to blueberries 2-4 weeks after burning, caused injury and reduced 1st-crop yields to an uneconomic level, although larger 2nd-crop yields made the total comparable to the control. Formative injury increased with the higher dalapon rates and was most frequent when dalapon was applied 4 weeks after burning, i.e. when buds were beginning to emerge from rhizomes near the surface. Data from plots treated with 3.4 lb./ac. 3 weeks after burning showed an increased number both of stems without first buds and of laterals per stem, but no difference in the average number of first buds per stem. This was because the increased number of laterals compensated for the reduction in stems without fruit buds. The dalapon gave best control of perennial grasses when applied at the latest date at 3.2-6.4 lb./ac. and was ineffectual when grasses were less than 2 in. tall. Mixtures of dalapon 0.8 and 1.6 lb./ac. with amino triazole 2 and 4 lb./ac. gave no better grass control than when a wetting agent was added to dalapon 1.6 and 3.2 lb./ac. or when the volume rate varied from 20 to 50 gal./ac.—From *Weed Abstr.*, 7, No. 1489.

337. CURTIS, O. F.

Grass and weed control under peach trees.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 100-7.

Dalapon 7 lb./ac. + monuron 3 lb./ac., applied in the spring to 16 sq. ft. around peach trees, controlled *Agropyron repens*, *Bromus arvensis*, *Lolium perenne* and summer annuals, and did not affect peach tree growth when repeated for 3 years. When extended to beyond the spread of the branches, tree growth decreased by about 10% during 3 years' treatment, but after the 1st year much of the spray was applied to weed-free soil. Heavier rates of dalapon and monuron applied separately have not caused severe reductions in the tree growth but leaf symptoms have sometimes occurred. These are described. Of 4 peach varieties tried significant differences were observed in the response to monuron, mainly in the contrast between Sunhigh and Triogem. Practical control of grasses was obtained with dalapon 7 lb./ac. and monuron 3 lb./ac., but a mixture of the 2 was

more effective against *B. arvensis* than either separately. Amino triazole 5 lb./ac. gave satisfactory weed control without injury to peach trees.—*Weed Abstr.*, 7, No. 1487.

338. JONES, T. H.

Rotations for control of weeds in strawberries.

Bull. Tenn. agric. Exp. Stat. 267, 1957, pp. 9.

In 3 experiments strawberries (var. Blakemore) were grown as part of various 4-year rotations. Those grown after soybeans, maize and lespedeza yielded less (often significantly so) than those grown after tobacco, tomatoes, snap beans, sweet potatoes or fallowing. This was attributed mainly to reduced weed populations with the latter rotations, but was also affected by the different fertilizer treatments for the crops. The time spent in weeding with the different treatments is given.—*Weed Abstr.*, 7, No. 1606.

339. VAN STAALDUINE, D.

Ervaringen bij onkruidbestrijdingsproeven in aardbeien. (Experiments with weed control in strawberries.) [French, English and German summaries.]

Meded. LandbHogesch. Gent, 1957, 22: 615-25.

Propham, CIPC, 2,4-DES and 2,4-D may be applied to Jucunda strawberries in the spring shortly after planting. Before runner formation Jucunda may be treated with CIPC+DNC or CIPC+PCP; earlier varieties, e.g. Deutsch Evern and Climax, may be injured by this treatment. Dalapon, monuron, diuron, simazin and 2,4-DES +DNC or +PCP have proved injurious. A table gives the susceptibility of 17 weeds to the carbamates and 2,4-DES.—*Weed Abstr.*, 7, No. 1458.

340. CURTIS, O. F., AND TOMKINS, J. P.

Herbicide effects on strawberry yield.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 53-9.

2,4-D (amine) 1 lb./ac. in November reduced yield of Catskill, Robinson, and Sparkle varieties by up to 50% but had no effect on Premier and Eden. 2,4-D (amine) 0.6 lb./ac. in August + Sesone (2,4-DES) 3 lb./ac. was not detrimental to any variety and did not aggravate damage when followed by November treatment of 2,4-D 1 lb./ac. or CIPC 1.7 lb./ac. CIPC 1.5-1.7 lb./ac. in November or May did not decrease yield and controlled seedling wheat which started in the mulch. In a hill planting of Catskill and Empire no detrimental effect on yield was caused by 4 summer applications of Sesone 4 lb./ac. or of Sesin (2,4-DEB) 3 lb./ac., or by 2 late summer applications of MH 2,000 p.p.m. Dinitro (amine) 1 lb./ac. and CIPC 2 lb./ac. applied in November both reduced yield by 20%. In a matted row block of Premier 2 late summer applications of Sesone, while runners were forming, tended to reduce

yield by about 10% (difference not significant). From authors' summary.]—*Weed Abstr.*, 7, No. 1459.

341. JULLIARD, B.

Essais de désherbage chimique de la vigne à la Station de Recherches Viticoles de Colmar (I.N.R.A.). (Experiments on chemical weed control in vines at the Colmar Viticultural Research Station.)

Progr. agric. vitic., 1958, 149: 272-9, and 150: 153-8, 179-82.

A series of experiments were carried out over 3 years with monuron, diuron and aminotriazole which were applied on different soils to several varieties on various rootstocks. Results were variable, but the following conclusions were drawn: a late application of 10 kg./ha. monuron to a light soil with a dense weed population was not satisfactory; on similar light soil application of 5 kg./ha. monuron or aminotriazole immediately after weed emergence gave adequate weed control until the following spring; on a heavy soil application of 10 kg./ha. monuron after weed emergence gave very good weed control.

342. MEADOWS, M. W., SWEET, H. A., AND FLAGG, C. V.

Control of bindweed in grapes.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 50-2.

When sodium salts of 6 benzoic acids (2,5-dichloro, 2,3,5- and 2,3,6-trichloro, 2,3,4,5- and 2,3,5,6-tetrachloro, and pentachloro-) were applied at 1 lb./ac. to mature grape plants, 2,3,6-TBA caused a complete kill of *Convolvulus arvensis* and of *C. sepium* without injuring the vines and was the only one to be effective. The sodium salts of 2,3,6-TBA and pentachloro-benzoic acid applied to the soil at 1 lb./ac. and as a foliar spray at 2,500 p.p.m. killed young, vigorously-growing Concord vines in the greenhouse. Benzac 103 A (composed of 2,3,5-trichlorobenzoic acid 16.3%, 2,3,6-TBA 7.8%, 2,3,5,6-tetrachlorobenzoic acid 36.4%, other isomers 39.5%) at 4 lb./ac., gave complete control of *C. arvensis* without depressing grape yields, though moderate hormone effects were caused; 2 lb./ac. also killed most *C. arvensis* plants and no regrowth occurred, but, although only slight hormone damage was caused yields were slightly reduced. No treatment caused any significant effect on refractometer readings.—From *Weed Abstr.*, 7, No. 1536.

Weed control in ornamentals.

(See also 380a, p.)

343. TICKNOR, R. L., AND GASIORKIEWICZ, E. C.
Preplanting treatments for weed control in nursery and herbaceous ornamentals.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 114-18.

Plots of 100 sq. ft. were treated with allyl alcohol 653 ml., chloropicrin 3 ml. (injections in 6-in. centres), methyl bromide 1 lb., Mylone 0.75 lb., Vapam 1 quart, and black polyethylene 1.5 mm. thick, 7, 14 and 21 days before planting *Ageratum houstonianum*, *Begonia semperflorens*, *Chrysanthemum morifolium*, *Coleus blumei*, *Hedera helix* and *Pelargonium hortorum* and the following woody species: *Forsythia intermedia*, *Kalmia latifolia*, *Pieris floribunda*, *Pinus thunbergi*, and *Taxus media hicksi*. Chloropicrin killed woody species when applied 7 days before planting. Otherwise no injury was caused. Methyl bromide gave 95% weed control, Mylone 85% and Vapam 85-90% when watered in but only 40% when injected. Plant growth with all 3 was good. Allyl alcohol and chloropicrin were ineffectual and black polyethylene involved excessive labour in planting. Vapam and VPM(?) at 1 and 1.5 quart/100 sq. ft. applied in a watering can and sealed with 15 gal. of water gave about 90% weed control and caused no injury to 27 species of annuals planted 20 days later. The turf surrounding the beds was also uninjured unless touched by the spray.—From *Weed Abstr.*, 7, No. 1472.

344. TICKNOR, R. L., AND BOBULA, P. F.

Rhododendron weed control by chemicals.

Quart. Bull. Rhodod. Soc., 1957, 11(3): 161-3, illus.

NPA 16 lb./ac., NPA 3+2,4-DES 3 lb./ac., 2,4-DES 10 lb./ac., monuron 0.5 and 1 lb./ac., diuron 0.5 and 1 lb./ac., and CIPC 4 and 6 lb./ac. were applied as directed sprays in June and August to weed-free soil in which were growing hybrid seedlings of *Rhododendron catawbiense*. Monuron and diuron gave over 80% weed control, late applications at the higher rates giving complete control. CIPC gave good control except for *Lamium amplexicaule* which proved resistant. NPA and/or 2,4-DES were inconsistent, being most effective in cool weather with adequate soil moisture. Monuron caused chlorosis of new growth of 2-year-old Japanese holly (*Ilex crenata convexa*) but did not affect 2-year-old Japanese yew (*Taxus cuspidata*), Pfizers juniper (*Juniperus chinensis pfizeriana*) or spreading cotoneaster (*Cotoneaster divaricata*). Application of herbicides in granular form is suggested to avoid plant damage.—*Weed Abstr.*, 7, No. 1623.

345. PRIDHAM, A. M. S.

Granular herbicides for weed control in nursery plantings.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 110-11.

Eight herbicides, used in granular form, alone or combined with CIPC, caused no injury to roses when they were applied on July 29, about 5 weeks after planting when foliage was first present. The following gave excellent control of both purslane

[*Portulaca oleracea*] and annual bluegrass [*Poa pratensis*]: CIPC 4 lb./ac. + simazin 4 lb./ac. or diuron 1 lb./ac.; CIPC 12 lb./ac. $\pm$ amino triazole 5 lb./ac., $\pm$ endothal 4 lb./ac. or 2,4-DES 4 lb./ac.; and diuron 4 lb./ac. The results of other trials involving both deciduous and evergreen nursery plants are also given.—From *Weed Abstr.*, 7, No. 1471.

346. TICKNOR, R. L., AND BOBULA, P. F.
Tolerance of *Taxus* and *Juniperus* to selected herbicides.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 112-13.

In the 7 months following treatment no injury has so far been caused to 3-year-old *Taxus media* Whicksi, *T. baccata dovastoni* or *Juniperus chinensis profitzeriana* by May applications of CDAA 40 lb./ac., CDEC 40 lb./ac., simazin 4-10 lb./ac., and EPTC 15-15 lb./ac., applied to weed-free plots. The EPTC plots were retreated a month later because of purslane (*Portulaca oleracea*) infestation, and all plots were retreated in September after removing weeds.—*Weed Abstr.*, 7, No. 1488.

347. ALLEN, H. T.
A review of chemical weed control in evergreens and deciduous trees and shrubs with special reference to shelterbelts.

Proc. 11th Mtg west. Sect. nat. Weed Cttee Canada, 1957, 1958, pp. 28-33, bibl. 16.

Cottonwood seedlings and red pine transplants were uninjured by dalapon 20 lb./ac., diuron 4 lb./ac., monuron 2 $\pm$ CIPC 20 lb./ac., 6-year-old red pine by dalapon 40 lb./ac., and *Taxus* by NPA, CIPC and 2,4-DES up to 20 lb./ac. NPA 20 lb./ac. controlled purslane [*Portulaca oleracea*], lambs quarters [*Chenopodium album*], pigweed [*Amaranthus* spp.] and prickly lettuce [*Lactuca scariola*]. Red pine was uninjured on muck soils by monuron 10 $\pm$ TCA 10 or + CIPC 20 or + endothal 20 lb./ac. The use of 2,4-D in 10 tree species used in shelterbelts is outlined.—*Weed Abstr.*, 7, No. 1861.

348. MATHER, J. C.
Chemical weed control in bulbs.

Comm. Gr., 1958, No. 3281, p. 1055.

Notes are given on weed control in tulip, daffodil and iris bulbs with the contact herbicides sulphuric acid, sodium arsenite or PCP applied in November, and with the residual material CIPC, alone or fortified, applied before weed emergence. Against couch grass in daffodil a pre-emergence or pre-planting application of 5 lb. Dowpon (dalapon) + gal. CIPC per acre has shown good promise.

349. WOLFE, J. S., AND HORTON, D. E.
Investigations on the clearing of weeds from bulb beds by flaming. [French, German and Spanish summaries 12 lines each.]
J. agric. Engng Res., 1958, 3: 324-35, bibl. 6, illus.

Trials are reported of weed control by flaming using a hand-controlled machine, a road heating machine and by burning straw. The authors reached the following conclusions: (i) Adequate clearance of weeds to allow unhindered lifting of bulbs can be effected by a flame machine which produces a temperature at the ground surface rising to 700° F. in 45 sec. (ii) Very effective weed killing is obtained by a burning straw layer with a density of 20 t/acre, and furthermore bulbs of narcissus left in the ground appear to produce flowers a few days earlier in the season following this treatment. (iii) If tractor-operated flame machines which produce a temperature at the ground surface rising to 900° F. in 100 sec. were in production, it is expected that they would kill weeds at a cost several times less than that of the burning straw method, though perhaps not quite so effectively. (iv) Weed-killing performance comparable with that of the burning-straw method should be obtained by machines producing a temperature at the ground surface of not more than 700° F. and maintaining it for about 160 sec.

350. GASIORKIEWICZ, E. C.
Comparison of granular and liquid applications of herbicides in gladiolus.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 119-23, bibl. 5.

Use of granular herbicides on gladiolus.
Gladiolus Mag., 1958, 33: 94-100.

The following were applied in liquid and granular forms on 13th June to gladiolus 3-4 in. high and (except for EPTC and CDEC) again 6 weeks later: dinitro 6 lb./ac., CIPC 6 lb./ac., diuron 1.5 lb./ac., simazin 2 lb./ac., EPTC 10 lb./ac., 2,4-DES 4 lb./ac., CDEC 8 lb./ac., Mylone 200 lb./ac. None of the treatments caused injury, except Mylone, which produced curling of young leaves. Dinitro gave better weed control in liquid than in granular form, whereas Mylone was superior, and simazin very slightly superior, as granular herbicides. EPTC, CDEC and 2,4-DES were ineffectual in both forms.—*Weed Abstr.*, 7, Nos. 1473 and 1621.

351. PRIDHAM, A. M. S.
Granular herbicides for weeds in ground cover plantings.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 108-10, bibl. 2.

A mixture of CIPC (granular) + 2,4-DES was more effective in controlling *Senecio vulgaris* than CIPC (granular) alone at the same rates; 4 lb./ac. of the former was as effective as 12 lb./ac. Myrtle (*Vinca minor*) was susceptible to CIPC (granular) 12 lb./ac. and *Euonymus fortunei* to both CIPC (miscible) 8 lb./ac. and CIPC (granular) 12 lb./ac. In further trials with granular herbicides CIPC 4 lb./ac., alone and in mixtures with 2,4-DES, simazin, endothal and amino triazole, have good control of annual bluegrass (*Poa pratensis*) 4 months after

application in July, while CIPC 0.25 lb./ac., amino triazole 1 lb./ac., diuron 0.25 lb./ac. and simazin 1 lb./ac., showed similar results when applied in October.—From *Weed Abstr.*, 7, No. 1528.

Weed control in tobacco.

352. ANON.

Killing broomrape in tobacco.

Span, 1958, No. 2, pp. 14-15, illus.

Experiments at the Tobacco Experiment Station, San Juan y Martinez, Cuba, showed that *Orobanche ramosa* could be killed without damaging tobacco crops by spraying the parasite and the soil around the tobacco with allyl alcohol at 10 c.c./gal. water. Trials carried out by Cia. Petrola Shell de Cuba S.A. using allyl alcohol in the form of A-A Weed Seed Killer have indicated the need to use high volume nozzles, to spray as soon as broomrape appears and to repeat treatments once a year for as long as the land remains infested.

353. PAL, N. L., AND GOPALACHARI, N. C.

A note on the root parasite *Orobanche* on tobacco and its control by weeding.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 52-4, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1181.

Orobanche occurs in nearly all Indian tobacco fields and especially those where flooding aids weed dispersal. In flue-cured crops the parasite can reduce yields by 27-40%. The systematic removal of broomrape plants each year before they seed will reduce infestation, and so will the rotation of tobacco with rice. The seeds do not appear to be able to live for more than 2 years in the soil.

354. (MATHRANI, D. I.)

Seminar on "*Orobanche*—concept of its incidence".

Indian Tobacco, 1958, 8: 107.

Orobanche seed germinated on filter paper placed on sand and moistened with distilled water. The addition of vitamin PP increased the germination percentage, which was also influenced by temperature. This showed that the presence of the host plant was not essential and emphasized the value of rotations and fallows in reducing *Orobanche* incidence.

Weed control in sub-tropical and tropical crops.

(See also 314, 315, 324, 327, 792.)

355. ASHTON, F. M., AND OTHERS.

Weeds in fruits, vegetables and row crops.

Res. Progr. Rep. west. Weed Control Conf., 1958, pp. 61-76.

Avocados: In a greenhouse test 1-year-old plants

were not affected by monuron 9 lb./ac. Established plants of the varieties Hass, Anaheim and Rincon tolerated 50 lb./ac., but 20 lb./ac. caused slight leaf injury to a 6-year-old seedling. Amino triazole 3 lb./ac. and simazin 40 lb./ac. caused no injury, but higher rates of both and of Baron [erbon] 4 lb./ac. were injurious. *Oranges*: These tolerated monuron and diuron 24 lb./ac., and little injury was caused by amino triazole, simazin or EPPC, all at 32 lb./ac. Dalapon had erratic effects, and 8 lb./ac. has caused 95% fruit drop. *Onions*: Of 6 herbicides applied preplanting only CDEC 4 and 8 lb./ac. was harmless enough to warrant further trials.—From *Weed Abstr.*, 7, No. 1484.

356. WALLIS, J. A. N.

Herbicides in Kenya coffee.

Pest. Abstr. News Summ., Sect. C, 1958, 4: 146-72, bibl. 8.

Bricky flavour in coffee was associated with the use of an aromatic oil emulsion fortified with PCP, and appeared to be more pronounced when the spray was applied through a hooded lance. Good weed control was obtained with 1 lb. acid equivalent/ac. of 2,4-D + 5 lb. (74% a.e.) sodium salt of dalapon in 40 gal. Dalapon at 10 lb./ac. in 80 gal. controlled couch grass (*Digitaria scalarum*) for 3 months when applied at the end of the short rains and for 2 months when applied before the short rains. Amino triazole (ATA) at 2 and 4 lb./ac., dalapon at 8 and 16 lb./ac. and PCP at 2 and 4 lb./ac. in oil were applied alone and in combinations. Dalapon at both rates gave good control of couch for 3 months but did not eradicate it, and at the higher rate ATA was the most effective against broad-leaved weeds. Both compounds caused some damage to coffee. Notes are also given on pot experiments and on work on observation plots.

357. GUZMAN, V. L., AND ORSENIGO, J. R.

Herbicidal weed control in sugarcane.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 261-2.

In stubble cane combinations of 2,4-D amine and monuron controlled a wider range of weed species more effectively than either herbicide alone; the most satisfactory combination was 1.5 lb. 2,4-D amine plus 2 lb. monuron per acre. Two monthly applications of a combined spray of dalapon plus 2,4-D amine (5 lb. + 1.5 lb. per acre) gave excellent grass and broadleaf control, and did not affect cane quality. The minimum dalapon dosage for adequate grass control appeared to be about 10 lb. per acre applied in 2 or 3 doses at monthly intervals to young grass growth after stubble cane emergence. Most cane injury was noted after 2 or 3 applications of dalapon at 4-5 lb. per acre to stubble cane 7½-14 in. high. A single overall application of

10 lb. per acre of dalapon to cane 12 in. high for control of seedling grasses resulted in a decrease in yield.

358. VERMA, R. D., AND BHARDWAJ, R. B. L.
A better way of tackling weeds in sugarcane.
Indian Fmg, 1958, 8(3): 29-31, illus.

In trials at the Indian Agricultural Research Institute, New Delhi, yields and profit were increased by combining hoeing with 2 spray applications of 2,4-D, each at 2 lb. acid equivalent per acre, one made before and the other after emergence.

359. THOMPSON, G. D., AND TRICHARDT, H.
Observations and results with weedkillers at Illovo.

Proc. 31st annu. Congr. S. Afr. Sugar Tech., 1957, pp. 125-6.

Post-emergence spraying against watergrass [nutgrass] in sugar cane of 15 lb. TCA plus 5 pt. 2,4-D in 35 gal. water gave adequate results in field practice, but dalapon and 2,4-D gave more promising results on an experimental scale. Results with other, less effective chemicals are reported.

360. CLEASBY, T. G.
The control of weeds by chemicals. Three experiments carried out by the Tongaat Sugar Company Ltd.

Proc. 31st annu. Congr. S. Afr. Sugar Tech., 1957, pp. 119-23, bibl. 1.

Although both TCA plus 2,4-D ester and dalapon plus 2,4-D ester gave longer control of water grass (nutgrass) and also controlled *Panicum maximum* in sugar cane, several other post-emergent treatments were also effective against water grass for 8 weeks and were cheaper. Of these a mixture of PCP and 2,4-D ester is recommended at 4 or 5 gal. and 1 or 1½ qt. per acre respectively.

Weed control in turf.

361. BREAKEY, W. J., AND OTHERS.

Weeds in lawns.

Res. Rep. nat. Weed Cttee, west. Sect., 1957, pp. 75-6.

Neburon at 2.1 lb./ac. in 25, 50, 100 or 200 gal., gave complete control of *Stellaria media*; overall sprays did not injure a blue-grass lawn, strawberries or raspberries, or a directed spray dahlias or iris. In a chewings fescue lawn neburon at 2 lb./ac. applied in early August gave 100% control of *Cerastium vulgatum* and 80% control of *Holcus lanatus*. Lower rates and a later application were less effective, and higher rates injured the turf. Boron herbicides did not give selective control of peppergrass [*Thlaspi arvense*], dandelion, common pliantain or round-leaved mallow [*Malva* sp.] in lawns whereas 2,4-D (amine) at 1 and 2 lb./ac. did. —From *Weed Abstr.*, 7, No. 1853.

362. GALLAGHER, J. E., AND JACK, C. C.

Chickweed control test 1956-57.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 151-3, bibl. 1.

Complete control of *Stellaria media* was obtained with 1 application of 2,4,5-TP 1.5 lb./ac., neburon 2 lb./ac. and simazin 4 lb./ac.; with 2 applications of 2,4-D (amide) 4.5 lb./ac., CIPC 1 lb./ac., 2,4-DP (2,4-dichloro-phenoxypropionic acid) 1.5 lb./ac. and MCPP 1.5 lb./ac.; and with 3 applications of dinoseb 1 lb./ac. and Alanap 1-F (NPA 1%) 720 lb./ac. Complete control of *Cerastium vulgatum* was obtained with 1 application of 2,4,5-TP 1.5 lb./ac. and MCPP 1 lb./ac.; and with 2 applications of 2,4-DP 1.5 lb./ac. and potassium cyanate + MCPA 16 lb./ac. In the winter 2 applications of simazin 4 lb./ac. and of CIPC 1 lb./ac. killed or reduced a large number of cool-season turf grasses.—From *Weed Abstr.*, 7, No. 1480.

363. (LANTZ, H. L.)

Chemical treatments can control crabgrass.

Ia Fm Sci., 1958, 13: 43.

In tests over 3 years disodium methyl arsonate has given 95-100% control of crabgrass with no damage to bluegrass turf [see also *H.A.*, 28: 1355]. On spring-sown mixed turf 3 applications of disodium methyl arsonate made during the summer and another the following year practically eliminated crabgrass without injuring the newly-seeded varieties.

364. FULWIDER, J. R., AND ENGEL, R. E.

Pre-emergence control of goosegrass in turf areas.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 138-9.

In pre-emergence trials in which chemicals were applied in June for the control of seeded *Eleusine indica* in a mixed turf of Kentucky bluegrass and colonial and creeping bentgrasses, chlordane (dry) 60 lb./ac. gave much the best control without injury to the turf. Arsenate of lead (dry) 653 lb./ac., 2,4-DEB 3 lb./ac. and neburon 2 and 4 lb./ac. gave some control, but neburon caused turf injury. Other treatments were either ineffective or injurious to the turf, or both.—From *Weed Abstr.*, 7, No. 1477.

365. ENGEL, R. E.

Four years of herbicidal treatment of *Poa annua* in bentgrass turf.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 140-1.

Spring treatments (March 25th-May 19th) with endothal 0.5 lb./ac. and with sodium arsenite 1 lb./ac. + 2,4-D 0.25 lb./ac. in 40 gal. water, applied 3 times for 2 seasons and twice for 2 more

years, produced reductions of 62 and 40% respectively in *P. annua* and also excellent clover control by endothal. Endothal produced temporary discoloration, the effect being more severe on *P. annua* than on the bentgrass. Discoloration with sodium arsenite was only slight. MH 1 lb./ac., applied similarly, stopped the flowering of *P. annua* but seriously damaged turf during the 2nd and 3rd years and caused heavy clover invasions.—*Weed Abstr.*, 7, No. 1478.

366. MOWER, R. G., AND CORNMAN, J. F.
Selective control of *Veronica filiformis* in turf.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 142-50, bibl. 1.

Two successive applications of endothal 1 lb./ac. in 50–100 gal. water gave 100% control of the lawn weed *V. filiformis* with only slight to moderate discoloration of a Kentucky bluegrass-red fescue-creeping bent turf. The addition of 2,4-D gave nearly complete control of dandelions and plantains without affecting the action of the endothal. Other materials were either ineffective against *V. filiformis* or injurious to the turf.—From *Weed Abstr.*, 7, No. 1479.

367. CRUZADO, H. J., AND MUZIK, T. J.
Effect of maleic hydrazide on some tropical lawn grasses.

Weeds, N. York, 1958, 6: 329-30, bibl. 4.

In dry weather, Manila grass (*Zoysia matrella*), sour paspalum (*Paspalum conjugatum*), centipede grass (*Eremochloa ophiuroides*), Java grass (*Polytrias praemorsa*) and carpet grass (*Axonopus compressus*) were sprayed with MH (diethanolamine) at 2, 4, 5 and 16 lb./ac. 2 weeks after cutting. Only centipede grass was significantly reduced in growth. Sprays of 4 lb./ac. or more adversely affected the colour of all except Manila grass; at the higher rates *Meibomia* spp. and *Alysicarpus vaginalis* were controlled.—*Weed Abstr.*, 7, No. 1619.

Weed control in vegetables.

(See also 317-321, 323-327, 329, 330, 355, 380i, 1, m.)

368. MUZIK, T. J., AND LAWRENCE, J. M.
Amino acid metabolism in bean roots as affected by drying and 2,4-D.

Proc. 16th west. Weed Control Conf., 1958, p. 31.

Similar changes in protein nitrogen, free amino nitrogen and individual free amino acids occurred in the roots of french bean plants sprayed with 2,4-D and those uprooted and allowed to dry out, suggesting that the changes are due to damage or death rather than being specific to 2,4-D.—*Weed Abstr.*, 7, No. 1557.

369. ZIVER M., A.

Efecto de las malezas en porotos y su control por desmalezaduras a azadon. (Effect of weeds in beans and their control by hoeing.) [English summary $\frac{1}{3}$ p.]

Agric. t c. Chile, 1956, 16: 97-100.

Under conditions at Paine in southern Chile, it was essential to weed beans a few days before the first irrigation. A second weeding 50 days after sowing was profitable and a third weeding 20 days later was also worthwhile.

370. DALLYN, S. L., AND OTHERS.

Progress report on weed control in onions, corn, tomatoes and seedbeds.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 74-80.

EPTC [ethyl-N,N-di-n-propylthiolcarbamate] 2.5–10 lb./ac., dinitro (water soluble and granular) 3 lb./ac., simazin 1.5 lb./ac. and neburon 2 and 4 lb./ac. were compared with CIPC 4 lb./ac. in transplanted sweet Spanish-type onions, but all were found to be inferior. The effects of 5 herbicides, applied once to an early and twice to a main season tomato variety are recorded. Vapam 1 and 1.5 qt./100 sq. ft., Mylone 100–200 lb./ac., and MC2 1 and 3 lb./100 sq. ft. were applied to seedbeds on April 29, and 5, 10, 15 and 20 days later cabbage seed and strawberry plants were planted. Vapam, when watered in with 1 in. of irrigation water, gave excellent weed control and was harmless to cabbage but injurious to strawberries planted within 5 and 10 days; when rototilled into the soil weed control was decreased and crop injury increased. Mylone, which was rototilled or raked into the soil, was less effective than Vapam in controlling weeds; all cabbage plantings except the first on the raked plots were uninjured, but the first 2 strawberry plantings showed some signs of injury. MC2 at both rates gave excellent weed control and only caused injury at the 3-lb. rate to the first strawberry planting.—From *Weed Abstr.*, 7, No. 1460.

371. HAWTHORN, L. R., TIMMONS, F. L., AND LEE, W. O.

Chemical weed control of annual weeds in seed onions.

Bull. Utah agric. Exp. Stat. 399, 1957, pp. 22, bibl. 27, illus.

Experiments comparing various herbicides, at 1 to 4 rates each, were conducted annually from 1950 to 1954. The treatments were applied (1) as the onion seed stalks were beginning to elongate, or (2) immediately after planting mother bulbs in early spring. The most promising herbicide in both groups of tests was monuron at 2 lb./ac. The material rarely reduced seed yields; it did, however, increase the danger of seed loss from lodging. Diuron gave very good weed control when applied as the seed stalks began to elongate. Other

useful materials in this first group of experiments were the wettable powder form of 2,4-D acid (no longer available) and 2,4-DES, both at 3 lb./ac. They tended to stiffen the stalks and make them less susceptible to lodging by wind. Rainfall or sprinkler irrigation, following applications, were desirable in the first group, and necessary in the second group of tests.

372. LACHMAN, W. H., MICHELSON, L. F., AND ALLEN, D. D.

Weed control in onions—1957.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 386-9, bibl. 2.

Whereas no injury or yield reduction resulted when CIPC 4-64 lb./ac. was applied pre-emergence on 23rd April to Golden Globe set onions on a Scarborough very fine sandy loam, rates of 8-16 lb./ac. and higher applied on 4th April caused dwarfing and chlorosis and reduced yields when applied to Ebenezer set onions on a Hadley very fine sandy loam. A much lower organic content in the Hadley soil (1.7% as against 5.1%) may have accounted for the difference in effect. Chlorazin 4-8 lb./ac. and EPTC 5-10 lb./ac. caused significant yield reductions when applied immediately after Early Yellow Globe onions had been sown on 18th April.—From *Weed Abstr.*, 7, No. 1465.

373. NOLL, C. J.

A progress report on chemical weeding of onions, beets, spinach, sweet corn, lima beans and tomatoes.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 81-7.

Of several herbicides applied to onions, either pre-emergence or both pre- and post-emergence, CIPC at 6 and 8 lb./ac. pre-emergence gave the best results. In pre-emergence trials in beets, the best results were obtained with endothal at 6 or 9 lb./ac. + TCA 10 lb./ac., endothal (granular) 9 lb./ac., monuron 0.6 lb./ac., CDEC 4 and 6 lb./ac. and CDAA 6 and 9 lb./ac., all of which increased yields compared with the unweeded control. When CIPC at 2 and 3 lb./ac., CDEC 4 and 6 lb./ac. and monuron 0.4 and 0.6 lb./ac. were applied to spinach at sowing, all gave good weed control without significantly affecting crop stand or yield. In pre-emergence trials in lima beans the best yield and weed control was obtained with G-27901 (2-chloro-4-ethylamino-6-diethylamino-s-triazine) at 4 or 8 lb./ac. Granular dinitro 13 lb./ac., chlorazin 6 lb./ac. and ACP M119 2 and 3 lb./ac. also increased yields to nearly double that of the controls. When 6 herbicides at 2 rates each were applied to tomatoes at lay-by, 3 significantly reduced yields. Weeds were not a problem.—From *Weed Abstr.*, 7, No. 1461.

374. PEA GROWING RESEARCH ORGANISATION LTD.
Controlling wild oats in peas.

Comm. Gr., 1958, No. 3279, p. 920.

Pre-sowing applications of TCA at $7\frac{1}{2}$ lb. or propham (IPC) at 3 lb. per acre gave 75-95%, and 50-90% control respectively. Applications of TCA resulted in loss of wax from pea leaf surfaces [see also *H.A.*, 28: 1426], the marrowfat peas being particularly sensitive, while Dutch blue and Maple peas were the most tolerant varieties. Crop damage was reduced to some extent by thorough incorporation of TCA into the soil. Propham had no visible effect on peas, but sometimes emergence was reduced.

375. SEXSMITH, J. J., AND OTHERS.

[Weed control in] field and canning peas.

Res. Rep. nat. Weed Cttee, west. Sect., 1957, pp. 92-4.

When harrowed in, pre-emergence applications of Radox (CDAA) and Geigy 444 E [2 chloro 4,6-bis (diethylamino)-s-triazine] to Dashaway peas at 6-9 lb./ac. gave good weed control with no yield reduction. Post-emergence applications of 2,4-D (amine) and MCPA (amine and sodium) all at 0.25 and 0.375 lb./ac. did not reduce yields. On Perfection peas there was little difference between MCPB alone and 1:15 MCPA + MCPB at the same total rates.—*Weed Abstr.*, 7, No. 1851.

376. LACHMAN, W. H., MICHELSON, L. F., AND ALLEN, D. D.

Weed control in spinach, lettuce and carrots—1957.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 399-401.

CDEC 2-6 lb./ac. gave good pre-emergence weed control in lettuce and spinach. EPTC 4-8 lb./ac. reduced yields of both crops, CDAA 2-6 lb./ac. reduced lettuce yield, and chlorazin 6-8 lb./ac. spinach yield. Chlorazin 4 lb./ac. + Stoddard Solvent 75 gal. gave good post-emergence weed control in carrots without injury to crop. Geigy 30031 2 and 4 lb./ac. gave very good weed control but was injurious to carrots.—From *Weed Abstr.*, 7, No. 1466.

377. MEGGITT, W. F.

Progress report on herbicides for weed control in tomatoes.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 92-5.

The following were applied at lay-by to Rutgers tomatoes: 2,4,5-TES 3 lb./ac., EPTC (ethyl-N,N-di-n-propylthiocarbamate) (spray and granular 5%) 5 and 10 lb./ac., simazin (spray and granular 10%) 1.5 and 3 lb./ac., neburon 2 and 4 lb./ac., CIPC (granular 5%) 4 and 8 lb./ac., CDEC 8 lb./ac., and (granular 10%) 4 and 8 lb./ac., CDAA (spray and granular 10%) 6 lb./ac. Spraying was at 40 gal./ac. There was little or no difference between spray and granular formulations except

that CDEC 8 lb./ac. was more effective as granular than as spray. Injury was caused initially by CDAA in spray form and by CDEC spray 8 lb./ac., and, 6 weeks after treatment, minor injury, which was soon outgrown, by 2,4,5-TES. None of the treatments significantly reduced yields, but yields from the higher rates tended to be lower, and, excepting EPTC at 5 lb./ac. yields from granular formulations tended to be higher than from sprays.—*Weed Abstr.*, 7, No. 1462.

378. SWITZER, C. M.

Effects of 2,4-D on turnips.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 96-9, bibl. 3.

The morphological and chemical changes induced in turnips by 2,4-D (low volatile ester) and 2,4,5-T were studied with a view to establishing symptoms of damage. The critical 2,4-D concentration for marked distortion was from 10-25 p.p.m.—From *Weed Abstr.*, 7, No. 1463.

379. ADAMSON, R. M., AND OTHERS.

[Weed control in] horticultural crops and sugar beet.

Res. Rep. nat. Weed Cttee, west. Sect., 1957, pp. 101-18.

Summarized results are given of weed control experiments in crop plants which included strawberries, raspberries, beetroot, onion, asparagus, tomato, cucumber, gladiolus and several tree fruit species. It is also reported that simazin at 2 lb./ac. applied immediately after sowing caused no apparent injury to beetroot, carrot or onion, but damaged bean, pea, radish, lettuce, cucumber and tomato.—From *Weed Abstr.*, 7, No. 1838.

Noted.

380.

a ANON.

Cost of rose weeding cut by 60 per cent.

Grower, 1958, 50: 675, illus.

By using the residual herbicides 2,4-DES in summer and CIPC in winter.

b ANON.

Killing bindweed in gooseberries with hormone sprays.

Comm. Gr., 1958, No. 3277, pp. 798-9, illus.

By careful application of MCPA.

c ANTognini, J.

Activity of EPTC as affected by soil moisture at time of application.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, p. 398.

See *Weed Abstr.*, 7, No. 1578.

d BARTLEY, T. R.

Physical and chemical properties indicative of good hydrocarbon solvents for aquatic weed control in irrigation systems.

Proc. 16th west. Weed Control Conf., 1958, pp. 34-9, bibl. 9.

See *Weed Abstr.*, 7, No. 1509.

e BOYLE, W. D.

Operation and maintenance cost savings from using aromatic solvents to control pondweeds in irrigation systems.

Proc. 16th west. Weed Control Conf., 1958, pp. 40-1.

Savings 25% compared with chaining.—From *Weed Abstr.*, 7, No. 1510.

f FREED, V. H., AND OTHERS.

Chemical and physiological studies.

Res. Progr. Rep. west. Weed Control Conf., 1958, pp. 83-96.

12 reports dealing with simazin, EPTC, ATA and endothal. See *Weed Abstr.*, 7, No. 1576.

g FRIESEN, G.

The use of a variable dosage sprayer in weed control research.

Canad. J. Plant Sci., 1958, 38: 300-6, bibl. 4, illus.

The advantages of the machine include a substantial reduction in the number of experimental plots needed.—Univ. Manitoba.

h JOOSTE, J. VAN DER W.

Control wild morning glory with hormone-type weedkiller.

Fmg S. Afr., 1958, 34(7): 39-40, illus.

MCPA recommended but only in Hermitage, Currant and French White vineyards.

i LANING, E. R., JR.

Sodium 2,2-dichloropropionate and sodium 2,2,3-trichloropropionate absorption and translocation in certain vegetable crops and residual activity in soil.

Diss. Abstr., 1958, 18: 1197, being *Publ.* 24,640 of 155 pp.

Uptake in bean and sweet corn.

j LILLIE, D. T., ALDRICH, R. J., AND MEGGITT, W. F.

An evaluation of the effects of carriers and method of application on the efficiency of herbicides applied pre-emergence.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 186-7.

CDEC and 2,3,6-TBA.—From *Weed Abstr.*, 7, No. 1568.

k NATIONAL WEED COMMITTEE, WESTERN SECTION.

1958 weed control recommendations for Western Canada.

[*Publ.*] *Canada Dep. Agric.*, [1957], pp. 30, and *Proc. 11th Mtg west. Sect. nat. Weed Cttee Canada* 1957, 1958, pp. 43-74.

Second reference in *Weed Abstr.*, 7, No. 1991.

- l NOLL, C. J.
Chemical weed control in vegetable crops.
Progr. Rep. Pa agric. Exp. Stat. **190**, 1958, pp. 3, illus.
 Materials, rates and times of application are recommended for 19 vegetables with notes of warning.
- m ROBERTS, H. A.
A review of the use of herbicides in British vegetable production.
Emp. J. exp. Agric., 1958, **26**: 283-92, bibl. 40.
 See also *H.A.*, 28: 1368m.
- n SWEET, R. D., CRABTREE, G., AND BAKES, D.
A comparison of granular and liquid carriers for herbicides.
Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 25-32.
 See *Weed Abstr.*, 7, No. 1553.
- o TIMMONS, F. L.
Profits from research on control of aquatic and ditchbank weeds on irrigation systems.
Proc. 16th west. Weed Control Conf., 1958, pp. 41-6.
 Research costs repaid 18-fold.—From *Weed Abstr.*, 7, No. 1511.
- p VAN DER ZWEEP, W., AND VAN DER GRAAF, A. J.
 Het onkruidbestrijdingsonderzoek in boomkwekerijgewassen in Nederland. (**Weed control research in nursery stock in the Netherlands.**) [English and German summaries.] *Meded. LandbHogesch. Gent*, 1957, **22**(3): 626-31.
 Effects of DNC, propham, CIPC and PCP on many young ornamental trees and shrubs.—From *Weed Abstr.*, 7, No. 1483.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 1, 2, 4, 8-10, 12-14, 20, 28, 33, 59, 70e, m, 71c, d, f, n, 311a, 368-379, 558c, e, x, 559h, i, 629, 773 l, 960d, 968.)

381. GUMPENSTEIN (KARNER, L.).
 Ergebnisse der Sonderkulturen-Versuche des Jahres 1956 und 1957. (**Results of variety trials with vegetables and other crops at Gumpenstein in the years 1956 and 1957.**)
Versuchsergebnisse der Bundesversuchsanstalt für Alpenländische Landwirtschaft Gumpenstein, Heft 41, 1957, pp. 103, illus., and Heft 44, 1958, pp. 96, illus.

Tabulated data on the varietal performance, under alpine conditions, appear in both numbers for the following among a few other crops: Cabbage, savoy, red cabbage, cauliflower, kohlrabi, brussels sprouts, lettuce, carrot, beetroot, celeriac, radish, black radish, pea, bean, onion, strawberry, medicinal plants and herbs.

382. SNYDER, G. B., AND OTHERS.
Department of olericulture.
A.R. Mass. agric. Exp. Stat. 1955-1956, pp. 51-3.

Results of experiments summarized include: *Weed control*: Excellent weed control was obtained with 1-1.5 gal. [per acre?] Premerge in plots of butternut squash, without reducing yield. Karmex W at 2-4 lb. per acre gave good control of most weeds in asparagus beds in moist soil. *Onion sets*: no bolting occurred after storage for 12 weeks at 86° F. during the winter, but loss in weight was 20-27%. *Greenhouse tomatoes*: the greatest returns were obtained from crops planted on February 1. Higher than normal growing temperatures for tomatoes resulted in better fruit set.

383. ASZTALOS, G.
 Adatok a zöldségfélék jarovizálázához. (**Vernalisation of vegetables.**) [Russian and German summaries $\frac{1}{2}$ p. each.]
Kert. Kut. Int. Évk. 1957, **2**: 281-94, bibl. 13, illus.

While vernalisation of pea seed at 0-3° C. improved earliness and yield the treatment did not prove economic. Treatment of tomato seed of 45-50% moisture content at 20-30° C. for 15-20 days improved germination, vigour and seedling growth, and increased early yield by 13-30% and total yield by 10-15%. Treatment of pepper seed of 55-60% moisture content at 30° C. for 10-15 days increased early yield by 35-50% and total yield by 10-15%.

384. HAHN, P., AND MILDNER, E.
 Neue Gemüsesorten für den Anbau 1959. (**New vegetable varieties for growing in 1959.**)
Dtsch. Gartenb., 1958, **5**: 205-7, illus.

Individual varieties of red cabbage, scorzonera, chicory, bush tomato, runner bean and pea are described. These were bred in Eastern Germany and tested for the varietal register in Berlin.

385. SCHUPHAN, W.
 Teneurs en amino-acides indispensables des végétaux alimentaires et de leurs diverses organes. (**Contents of essential amino acids in food plants and their various organs.**) [English and German summaries $\frac{1}{2}$ p. each.]
Qual. Plant. Maveg., 1958, **3/4**: 19-32, bibl. 18.

Quantitative data are presented for edible parts of many varieties of cabbage and other brassicas, lettuce, endive, corn salad, spinach, beet (leaves), kohlrabi (leaves), chicory, turnip leaves, asparagus,

peas, runner beans and broad beans. Nutritive value (based on essential amino acid index) was high in leafy vegetables with normal internodes, but considerably lower in cabbages, brussels sprouts and heart-forming types. Cabbage-lettuce, however, shows a very high index figure for the young leaves of the heart, although their total protein content is only $\frac{1}{2}$ of that in young spinach leaves on a fresh-weight basis.—Bundesanst. Qualitätsforsch., Geisenheim.

386. GERALDSON, C. M.

Effect of different sources of nitrogen and potassium in fertilizers on yield and quality of vegetables.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 305-6.

High yields of autumn crops of tomatoes and runner beans were associated with ammonium nitrate as a N source [see also *H.A.*, 27: 1923], while the lowest yields followed nitrate of soda-potash applications. With a spring crop highest yields and quality were obtained with applications of potassium nitrate plus calcium nitrate, calcium nitrate and ammonium nitrate. In trials with 3 sources of potash, nitrate of soda-potash was inferior to other K sources on an autumn crop, while nitrate of potash plus calcium nitrate rated high in a similar comparison on a spring crop.

387. DUMITRESCU, M.

Îngrășarea culturilor de legume în timpul vegetației. (Fertilizing vegetables during the growing period.) [English, French, Russian and German summaries $\frac{3}{4}$ p. each.] *Grăd. Via Liv.*, 1958, 7(6): 9-15 + summaries.

The effect of various forms of mineral fertilizers on vegetables grown under irrigation on a chestnut soil was studied over 3 seasons. Tomato and other deep rooted crops responded best to solutions, early cabbage and other less deeply rooted plants to the powder form, while shallow rooted crops such as lettuce, spinach, onion and radish gave the highest yield after granular applications.

388. ERICKSON, L. C., AND WEDDING, R. T.

Frequency of mineral application to five media in the greenhouse production of plants.

Proc. Amer. Soc. hort. Sci., 1958, 71: 485-95, bibl. 5, illus.

Bean, cabbage, cantaloupe, cotton, lettuce, sorghum, sugar beet and tomato plants were grown in the greenhouse with 5 frequencies of mineral application (every 1, 3, 7, 14 or 28 days) and 5 growing media (water, sand, sand-peat, sand-soil-peat, and vermiculite). The growth of plants receiving minerals every day was significantly greater than that of plants receiving less frequent applications. Water was the best root medium for 4 crops (including bean, cabbage and cantaloupe)

when all frequencies of mineral application were considered. When only daily frequency was considered, sand ranked first as a medium for 4 crops (including cabbage, cantaloupe and lettuce), sand-peat was best for 3 crops (including bean and tomato) and soil-sand-peat was best for one crop. With lemons responses to the 1-, 3- and 7-day frequencies of mineral application did not differ significantly; the two best media in this case were soil-sand-peat and sand-peat.—Univ. Calif., Riverside.

389. LINGLE, J. C., AND CAROLUS, R. L.

Sodium and boron contents of several vegetable crops and varieties as influenced by the sodium and boron level of the soil.

Proc. Amer. Soc. hort. Sci., 1958, 71: 507-15, bibl. 14.

Two levels each of Ca, K and Na, with 3 levels of B, were given to 25 varieties of 14 vegetable crops. Sodium significantly increased the yields of carrots, beets, spinach, turnips and swedes and reduced those of snap beans. Boron had little effect on vegetable yields, except those of snap beans which were depressed. The interaction of Na and B produced significant growth responses in beets, peas and snap beans. With beets B applications without Na tended to depress yields, but with Na they increased yields. With snap beans and peas separate Na or B applications adversely affected yields, but when they were combined the deleterious effect of each was reduced. Sodium applications significantly increased leaf contents of Na in all crops except snap and lima beans and squash. Boron concentrations in most crops increased with B applications, but there were great differences in the contents found in different crops and varieties. Sodium applications significantly increased B absorption by carrots, beets, spinach, peas, snap beans and cucumbers.—Univ. Calif., Davis, and Mich. St. Univ., E. Lansing.

390. WIERSEMA, G. P.

Verdichting in de grond. (Soil compaction.) [English summary 14 lines.]

Meded. Dir. Tuinb., 1958, 21: 425-9, bibl. 5, illus.

Some examples are given of yield reductions in vegetable growing as a result of soil compaction. Methods of minimising soil compaction in fruit growing are briefly discussed.

391. LAUENSTEIN, A.

Festigkeitsunterschiede innerhalb von Erdtöpfen. (Differences in resistance within soil pots.)

Dtsch. Gartenb., 1958, 5: 228-9, bibl. 1, illus.

Soil pots were measured after construction in the usual manner, and it was shown that compaction was greater in the top third than in the 2 lower thirds. Average plant weights of 3-week-old

kohl-rabi seedlings after direct sowing in soil pots were slightly lower in more compact than in less compact soils.—Inst. Landtechnik, Potsdam.

392. KIM, C. M.

Effect of saline and alkaline salts on the growth and internal components of selected vegetable plants.

Physiol. Plant., 1958, **11**: 441-50, bibl. 24.

Radish, cabbage and lettuce seedlings in pots of loam were progressively reduced in chlorophyll and carotene content by increasing the concentration of either sodium chloride or sodium carbonate in the irrigation water from 0.5 to 6 atmospheres. The carbonate had more effect than the chloride on both chlorophyll and carotene although this was not significant. The chloride had the greater effect in reducing ascorbic acid content in radish and cabbage. (Lettuce was not included in this last test.)—Seoul nat. Univ., Korea.

393. TROCMÉ, S., AND DUPRAT, A.

Sur la fumure phosphatée en culture maraîchère intensive. (On phosphate manuring in intensive market gardening.)

C.R. Acad. Agric. Fr., 1958, **44**: 635-9.

In the outskirts of Paris and Orleans the soils are rich in phosphate but limited responses are obtained to phosphate dressings. The possible reasons are discussed. The continued application of moderate dressings is recommended.

394. HOLMES, E. S., AND HALSEY, L. H.

Mechanical equipment as an aid to the harvesting and handling of cabbage, cucumbers, tomatoes and other vegetables handled in a similar manner.

A.R. Fla agric. Exp. Stat., 1956-57, pp. 37-8, 162-3.

A harvesting-aid machine built on an iron framework with 2 horizontal conveyer belts, transfer and lifting belts was used successfully to harvest cabbage, cauliflower and cucumbers, but with savoy the heads were too large for the conveyer belt. Cabbage harvesting was only slightly faster than wholly by hand, and cucumbers were harvested more quickly by hand without machine aid in 4 out of 5 tests. In studies of handling injuries there were fewer cut and bruised heads when cabbages were loaded by machine than by hand. Damage to cucumbers was similar with both methods of bagging. In a commercial test cucumbers, after a week's storage, showed more scuffing injury following machine harvesting.

395. CHESSIN, M.

Light quality and photoreactivation of plants and viruses.

Ann. appl. Biol., 1958, **46**: 388-92, bibl. 12, illus.

Visible light of different spectral regions was tested

for its ability to reverse 3 effects of ultra-violet radiation, namely, injury (glazing) of french bean leaves, increased resistance of french bean leaves to infection by the Rothamsted tobacco necrosis virus, and inactivation of potato virus X in tobacco leaves. All 3 effects were reversed only by regions of wavelengths shorter than 4700 Å. Thirty minutes of illumination with visible light at 300–380 f.c. counteracted the effects of ultra-violet light to a considerable extent, but potato virus X irradiated with ultra-violet light did not become affected by visible light until 30 min. after the tobacco leaves had been inoculated.—Rothamsted exp. Stat., Harpenden.

396. FIEDLER, H. J.

Die Wirkung organischer Substanzen auf die Bodenstruktur und das Pflanzenwachstum. (The action of organic substances on soil structure and plant growth.)

Dtsch. Gartenb., 1958, **5**: 184-6, bibl. 1, illus.

Applications of HPAN and VAMA to a red soil have resulted in improved structure and increased microbiological activity. In a series of pot and field studies yields of carrots and radishes were increased, and germination of tomato seeds was improved. Flower and vegetable crops, and tobacco also showed favourable responses to improved soil structure. In a soil treated with VAMA there was no increase in nutrient uptake by radish and spinach, and Na uptake by peach seedlings was reduced. Plant contents of P and K increased after VAMA application.

397. ALTMAN, J.

Studies on the control of plant diseases with antibiotics with particular reference to streptomycin.

Diss. Abstr., 1958, **19**: 201, being *L.C. Card No. Mic* 58-2386 of 164 pp.

Bacterial leaf spot of peppers [*Xanthomonas vesicatoria*] was significantly reduced by streptomycin sprays and dusts in both inoculated and naturally-infected peppers. The best results were obtained with a spray containing 200 p.p.m. streptomycin, and with a 5,000 p.p.m. dust. Peppers were the most tolerant of the crops tested to streptomycin; 2 applications of 1,600 p.p.m. sprays resulted in little or no foliage toxicity. Infection of halo blight of beans [*Pseudomonas phaseolicola*] was reduced by 3 sprays of 200 or 400 p.p.m. streptomycin, pod infection being reduced more than leaf infection. Streptomycin at 50 and 100 p.p.m. used with or without 1% glycerine significantly reduced downy mildew of broccoli [*Peronospora parasitica*]. Sprays of 100 p.p.m. and higher were phytotoxic. Bacterial leaf spot of ivy was not controlled by sprays of streptomycin plus fermate. Streptomycin injury to plants was shown as chlorophyll breakdown. Strepto-

mycin toxicity to beans growing in culture solutions containing 200 p.p.m. streptomycin was prevented to some extent by 2.5 p.p.m. Mn and 6.7 p.p.m. EDTA.—Rutgers Univ.

398. VAN ANDEL, O. M.

Investigations on plant chemotherapy. II. Influence of amino acids on the relation plant-pathogen. [Dutch summary.]

Tijdschr. PlZiekt., 1958, **64**: 307-27, bibl. 28, illus.

In tests with cucumbers, treatment with most of the amino-acids tested had no effect on plant resistance to *Cladosporium cucumerinum*. Treatment with DL-serine, DL-threonine, L-threo- β -phenylserine and DL-histidine before inoculation, however, produced a marked decrease in plant susceptibility, which was further reduced when these compounds were applied with a non- or partially systemic fungicide (thio- or dithiocarbamates). Glycine, DL- α -alanine and some related compounds also reduced plant susceptibility when applied with a fungicide. In broad bean and tomato plants, various amino acids (especially DL-serine) decreased susceptibility to *Botrytis fabae* and *Phytophthora infestans*, respectively; in tomatoes a more favourable effect was obtained with the addition of a fungicide. [For Part I see *H.A.*, 26: 2781.]—Lab. Phytopath., Wageningen.

399. MOORE, W. D., AND ELLISTON, R. A.

Control of damping-off and root rots of vegetable crops.

A.R. Fla agric. Exp. Stats, 1956-57, p. 291.

Vapam, PCNB, and 36% PCNB plus 25% captan applied when planting beans or 2 weeks previously significantly reduced post-emergence damping-off (*Pythium* spp.). There was also a reduction in numbers of stem lesions resulting from *Rhizoctonia* and *Pythium* infection. Surface applications of PCNB plus captan after sowing peppers significantly increased seedling stands. The incorporation of sugarcane bagasse and hay to inoculated sterilized soil significantly reduced infections of *Rhizoctonia* and *Pythium* in pot experiments with beans. In the field both materials reduced infections, treatment for 2 years being more effective than one season's treatment.

400. ACKERMANN, H. J., AND OTHERS.

Spectrophotometric determination of pentachloronitrobenzene on food and forage crops. *J. agric. Food Chem.*, 1958, **6**: 747-50, bibl. 2.

Three procedures are described for determining Terraclor (pentachloronitrobenzene) residues in vegetables, forage crops and oil seeds, respectively. In tests on vegetable crops it was shown that Terraclor applied to the soil is not translocated to leaves or fruits.—Olin Mathieson chem. Corp., New Haven, Conn., etc.

401. OVERMAN, A. J., AND KELSHEIMER, E. G.
Control of nematodes injurious to vegetable crops.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 300-2.

Preplanting treatments of Nemagon at 6, 8 and 10 gal. per acre, and of V-C 13 at 15 and 20 gal. per acre reduced nematode infection on cucumbers. With tomatoes Nemagon at 4-10 gal. per acre and V-C 13 at 5-20 gal. per acre reduced the amount of rootknot. Nemagon at 8 and 10 gal. per acre was highly toxic to tomatoes, but cucumbers were not affected. Nematode control by Nemagon at 8 and 10 gal. rates persisted into the second crop of tomatoes, without phytotoxicity. The most successful method of Vapam application to strawberry beds was by injection of $\frac{1}{2}$ the material 4 in. below the surface, and $\frac{1}{2}$ the material drenched on the surface before covering with a 4 in. bed. Soil fungal populations were reduced by 50 gal. Vapam per acre in one trial, and rates of 4-33 gal. per acre were effective on a fine sand; these rates also reduced nematode populations. In soil fumigant tests with shallots, vapam produced the highest yield, followed by parathion, V-C 13 and Crag Mylone. Telone was also an effective fumigant. [For earlier work see *H.A.*, 28: 408.]

402. WOLFENBARGER, D. O.

Serpentine leaf miner: brief history and summary of a decade of control measures in South Florida.

J. econ. Ent., 1958, **51**: 357-9, bibl. 3.

Since 1947 *Liriomyza pusilla* has caused serious injury to beans, cabbage, okra, peas, tomatoes and other vegetables. Results of trials on control of the pest on tomatoes and potatoes are here described. Certain of the chlorinated hydrocarbon insecticides such as chlordane, lindane, toxaphene and aldrin were effective initially, but became ineffective after 1 to 3 seasons. Certain of the phosphorus insecticides such as parathion, EPN and Diazinon gave outstanding control. Parathion, however, does not appear to be as effective after 10 years as it was initially. At present Diazinon is recommended.—Sub-trop. Exp. Stat., Homestead, Fla.

403. WAITES, R. E., AND VAN MIDDELEM, C. H.
Residue studies of DDT and malathion on turnip tops, collards, snap beans and lettuce.

J. econ. Ent., 1958, **51**: 306-8, bibl. 10.

Analyses of turnip tops, sprayed 3 times with malathion at the rates of 10.1, 20.2 and 30.3 oz. active ingredient per acre per application, showed initial deposits of 1.3, 2.1 and 4.5 p.p.m., respectively. Collards sprayed twice with malathion at 16 oz. active ingredient per acre showed residues no greater than 3.9 p.p.m. 3 days after the last application. Two applications of DDT at 16 oz. active ingredient per ac. left residues of 31.6 and

18.4 p.p.m. on collards and lettuce, respectively. The DDT residue on collards dissipated rapidly, and, by the 14th day, was below the federal tolerance of 7.0 p.p.m. The DDT residue on lettuce declined at the rate of approximately 1.0 p.p.m. per day and was also below tolerance at the end of 14 days. Snap beans sprayed twice with DDT at 12 oz. active ingredient per acre showed an average residue of 0.8 p.p.m. 1 day after the last application. [Authors' abstract.]-Fla agric. Exp. Stats, Gainesville.

Asparagus.

(See also 558r, s, 559s.)

404. LODEWIJKS, N. C.

Early sex determination of asparagus.

Fmg S. Afr., 1958, 34(6): 25, illus.

At Nelspruit (with a short, mild winter) sowing asparagus in March or April resulted in earlier flowering than from normal spring sowing (in July). A high percentage of the plants can be sexed within a year from sowing.—Hort. Res. Stat., Nelspruit.

405. HANNA, G. C., AND DONEEN, L. D.

Asparagus irrigation studies.

Calif. Agric., 1958, 12(9): 8, 14-15.

Six different treatments were given to a newly-established planting of asparagus on a sedimentary soil. Both intermediate and wet treatments had significantly higher yields than the dry plots. The difference in mean weight per spear between intermediate and wet plots was significant. The average number of spears per crown over the 7-year period was not related to irrigation treatment, but in the first 4 years more spears were produced on dry plots than on irrigated plots, and more spears were produced with the intermediate than with the wet treatment. Size of spear was related to irrigation. Results have shown that asparagus can utilize about 20 in. of irrigation during the growing season in addition to the normal 16 in. rainfall.

406. SCHULTZ, H. B., AND CARLTON, A. B.

Wind protection for asparagus.

Calif. Agric., 1958, 12(8): 6, 13, illus.

Snow fences spaced at 70 ft. were not effective in reducing wind erosion in asparagus beds. Two rows of barley planted between the asparagus beds did protect them from wind, being more effective when cross winds were blowing than when winds blew parallel to the beds.

407. ROHDE, R. A., AND JENKINS, W. R.

The chemical basis of resistance of asparagus to the nematode *Trichodorus christiei*.

From abstr. in *Phytopathology*, 1958, 48: 463.

Asparagus, var. Mary Washington, would not support populations of *Trichodorus christiei* for more than 40-50 days. Decline of populations on

young plants was at the same rate as starvation in sterile soil, but after fleshy storage roots had formed, population decline was more rapid. Tomato, normally a good host, supported only very low nematode populations when asparagus was present in the same pot. *T. christiei* did not feed on asparagus after it has passed the young seedling stage. Juice from asparagus roots was toxic to individuals of *T. christiei* and several other nematode species when diluted 1:10, while tomato root juice was not toxic. A toxic compound was isolated from this juice for which a proposed empirical formula is $C_6H_{12}O_4$. The product was carbohydrate-like and was obtained from root leachates as well as from the roots themselves. The toxic compound caused non-reversible paralysis of nematodes in water solutions of 100 p.p.m. or less. Populations of *T. christiei* around tomato roots were reduced by either spraying the leaves or drenching the root zone with 1,000-p.p.m. solutions of this compound.

Brassicas.

(See also 108, 558f, h, m, u, y, 559f.)

408. WOOD, P. D., AND WILLIAMS, A. M.

Brassicas.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 12-14.

Results of N.I.A.B. variety trials of winter cauliflower are reported. In a planting and spacing trial with broccoli the best planting date was found to be during the first half of July. With an early variety close spacing did not affect total yield but resulted in a larger proportion of smaller heads; with a late variety yield was considerably increased in spite of more smaller heads. Stem rotting of early broccoli was not reduced by application of B, Mn or Mg.

409. FINCH, C. G.

Winter cauliflower trials in the south-west, 1953-1957.

J. nat. Inst. agric. Bot., 1957, 8: 143-63, illus.

Twenty-one varieties of winter cauliflower of 4 maturity periods (from November to early March) were grown in trials in Cornwall, Devon and Hampshire during the seasons 1953-54 to 1956-57. *Extra early period*: Seale Hayne Extra Early gave the best results, but was challenged by the autumn variety Tremendous, which was superior in all respects except resistance to ring spot disease. *No. 1 period*: SH 10/5/8 was the best variety early in this period, but Trevean Second and Seale-Hayne No. 1 A6 were better later. *No. 2 period*: Heads of SH 21/4/24 matured early and were of outstanding quality. Seale-Hayne No. 2 B1 was a superior mid-period variety. *No. 3 period*: Plants of SH 30/5/19 gave the highest quality curds and the yield was good. Trevean Fourth gave good yields of good quality heads. Clucas' No. 3 gave high

yields but the heads were of poor quality. [For information on periods Nos. 4 and 5 see *H.A.*, 27: 1447.] J.R.L.

410. SHEPHERD, F. W., AND WOOD, P. D.
Varieties of winter cauliflower at Rosewarne, 1952-55.

J. nat. Inst. agric. Bot., 1957, 8: 135-42.

Collections of varieties and strains of winter cauliflowers were grown in 3 seasons. The hardiness, quality and disease resistance of the Angers, Cornish, English Hardy, Italian and Roscoff types are described, and it is concluded that only the Roscoff type varieties are suitable for Cornish conditions. The yield and quality of heads from plants of the Roscoff strains, which are grouped under 6 periods of maturity, were better in the No. 4 period (mid-March to Early May) than in the No. 1 period (mid-December to mid-February) or in the Extra Early period (mid-November to mid-January). The poorest heads were obtained from plants of the No. 2 and No. 3 periods maturing from early January to mid-April. J.R.L.

411. NIKONENKO, D. A.
The growth and yield of late cabbage in relation to weather conditions. [Russian.]
Agrobiologija, 1958, No. 3, pp. 144-6.

The conditions necessary for southern cabbage varieties to produce yields of more than 500 centners per ha. are: mean daily temperature 20-24.5° C., relative humidity not less than 40%, average daily rainfall not less than 2.5 mm., and, during heading, mean daily temperature 16-21° C. and daily sunshine 7½ hours.

412. SCHUPHAN, W.
Différences génétiques de qualité des protéines et de teneurs en amino-acides indispensables chez les végétaux alimentaires. (Genetical differences in protein quality and content of essential amino acids in food plants.) [English and German summaries ½ p. each.]

Qual. Plant. Maveg., 1958, 3/4: 34-44.

Kale, Savoy, red and white cabbage were compared for yield, crude protein content, essential amino acid content, calorific value and contents of vitamin C and carotene. Protein quality was highest in kale and lowest in red cabbage. Carotene was present only in kale.—Bundesanst. Qualitätsforsch., Geisenheim.

413. ATTIA, M. S.
Effect of spacing on the seed yield of the Hindy 7 variety of cauliflower. [Arabic summary ½ p.]

Ann. agric. Sci. Cairo, 1957, 2(1): 105-8.

Planting 20 in. apart gave a greater yield of seed than planting 24 in. or 28 in. apart on ridges spaced at 28 in. or 24 in. The spacing between the

ridges had no effect on yield of seed.—Veg. Res. Stat., Dokki. J.R.L.

414. BOCHOW, H.
Beiträge zur Frage des Einflusses einer organischen Düngung auf den Befall von Pflanzen durch parasitische Pilze. I. Über den Einfluss verschiedener Kompostgaben auf den Herniebefall (*Plasmodiophora brassicae* Wor.). (Contributions to the problem of the influence of organic manuring on plant attack by parasitic fungi. I. On the effect of different amounts of compost on clubroot incidence.) [English summary 8 lines.]
Phytopath. Z., 1958, 33: 127-34, bibl. 12, illus.

In pot experiments different amounts of compost added to the soil, which was infested with *Plasmodiophora brassicae*, had different effects on the degree of disease incidence in the test crop, mustard: if soil infestation was light, low applications of compost (3-5% by weight) slightly increased clubroot, but higher applications reduced disease incidence, especially when the infestation was mild. A clear correlation existed between increase and reduction in clubroot and the amount of compost added.—Univ. Rostock.

415. COLHOUN, J.
Club root disease of crucifers caused by *Plasmodiophora brassicae* Woron. A monograph.
Phytopath. Pap. Commonw. mycol. Inst. 3, 1958, pp. 108, bibl. pp. 13, illus., 20s.

This comprehensive monograph of "the most important disease of cruciferous crops in the temperate zone" covers the following aspects: economic significance, early history, geographical distribution, common names, symptoms, life history, environmental factors (soil and climatic) in relation to infection, reaction of the host to infection, spore survival and dissemination, host range (both cruciferous and non-cruciferous plants), varietal reaction of cultivated hosts to infection (species by species), physiologic specialization of the parasite, the nature of host resistance, control of the disease, and methods for the evaluation of soil treatments. The section on control measures (pp. 68-92) deals in turn with sanitation, crop rotation, cultural practices, drainage, seed disinfection and the many methods that have been tested for treating soil.

416. STANĚK, M.
Účinek přípravku HCH na padání pařenistních rostlin, způsobeného houbou *Rhizoctonia* (*Moniliopsis aderholdi* Ruhland). (The effect of BHC on the damping-off of hotbed plants caused by *Rhizoctonia*.) [English and Russian summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 455-66, bibl. 4.

When using 10% BHC in the soil in frames against pests, a dose of 0.02 kg./100 kg. soil is recommended, as in most cases this also restricts damping-off of cauliflower and cabbage. The action of BHC on fungus and host plants is discussed.

417. GENUNG, W. G.

Biology and control of insects attacking cruciferous crops in Florida.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 258-9.

In tests of insecticides for control of cabbage looper (*Trichoplusia ni*) endrin gave nearly complete control of the larvae. Toxaphene, phosdrin, thiodan and toxaphene plus phosdrin gave a fair degree of control. For control of mixed aphid infestations on cabbage (*Brevicoryne brassicae*, *Myzus persicae* and *Rhopalosiphum pseudobrassicae*) organic phosphorus materials gave excellent control, without any indication of resistance to parathion. On turnips parathion emulsion 4, parathion plus perthane, toxaphene plus parathion, guthion plus toxaphene and guthion gave excellent control of these 3 aphid species. The southern armyworm (*Prodenia erdania*) on collards was most effectively controlled by endrin.

418. JAMESON, H. R.

The mechanism of the control of turnip flea beetle by benzene hexachloride dressings on brassicae seed.

J. Sci. Food Agric., 1958, 9: 590-6, bibl. 7, illus.

Laboratory experiments have shown that kale seedlings recently emerged from seed treated with γ -BHC are highly toxic to flea beetle [4 species of *Phyllotreta*]. This toxicity falls rapidly in the week following emergence of the seedlings, but their protection against material damage by flea beetle is maintained for another 2 or even 3 weeks. The experiments indicate that initial protection is due to γ -BHC from the seed dressing contaminating the seedling leaves directly. When the plants are about a week old the insecticide reaches the leaves systemically through the roots; some is then volatilized through the leaves in amounts causing low mortality of the insect, but nevertheless, preventing it from causing serious damage to the plant. [Author's abstract.]—I.C.I. Ltd., Jealott's Hill Res. Stat., Bracknell.

419. THOMAS, P. R.

Savoys: control of swede midge.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, p. 86.

Seed bed sprays of dieldrin at the 4-leaf stage and again 10 days later reduced swede midge [*Contarinia nasturtii*] attack on savoys by 90% at planting out time. Dipping the plants and spraying twice in the field reduced attack from 50% to 12%.

420. HELLQVIST, H.

Fortsatta försök i vitkål med bekämpning av kålflugelarver. (Further experiments on the control of cabbage root fly larvae.)

Växtskyddsnotiser, 1958, 22: 39-42, illus.

Dipping cabbage roots in a slurry of soil and aldrin emulsion gave satisfactory control of root fly larvae where the attack was moderate. Where the crop is exposed to severe infestation the treatment should be supplemented by watering the plants with aldrin emulsion at a later date. [For preliminary trials see *H.A.*, 26: 2771.]

421. MORRIS, R. F.

Biology and control of the purple-backed cabbageworm in Newfoundland.

J. econ. Ent., 1958, 51: 281-4, bibl. 6, illus.

Evergestis pallidata was found to be unusually free from natural enemies, not a single parasite being reared from field-collected larvae in a 3-year study. Satisfactory control was obtained with DDT either as a spray or as a dust. A spray containing 1 lb. of 50% DDT wettable powder in 50 gal. of water applied to cabbage and turnips at 125 gal. per acre gave 90% reduction; 3% dust at 25 to 35 lb. per acre gave 83% reduction. [From author's abstract.]

422. WOLFENBARGER, D., AND HIBBS, E. T.

Onion thrips (*Thrips tabaci* Lind.) infesting cabbage.

J. econ. Ent., 1958, 51: 394-6, bibl. 7.

Infestations of thrips, principally *Thrips tabaci* Lind., but including small numbers of *Frankliniella fusca* (Hinds), *F. tritici* (Fitch), *F. exigua* Hood, and *F. tenuicornis* (Uzel), have seriously damaged maturing fresh market cabbage in eastern Iowa. The thrips were not controlled by insecticides after they had become established within the cabbage heads. Of a series of materials compared in field plots in 1956 and 1957 heptachlor was the most effective in preventing damage. Following a weekly schedule of applications of heptachlor at $\frac{1}{2}$ lb. per ac. the marketable crop was increased 30% above that of untreated check plots, where losses ranged from 36 to 39% of the crop. [From authors' abstract.]

423. HORN, H. H.

Der Einfluss des Erntetermins auf den Ertrag und den Erlös bei der Kopfkohlernte. (The effect of time of harvesting on cabbage yields and returns.)

Dtsch. Gartenb., 1958, 5: 204-5.

With a white cabbage and a red cabbage variety harvesting once yielded as much as repeated cutting, figures being given for weight and returns. In the case of white cabbage, delaying the harvesting date produced the highest yields. Mechanical harvesting may be possible when the heads are

uniformly mature.—Inst. Landtech., Potsdam-Barnim.

424. NYHLÉN, Å.

Lagring av vitkål. Försök vid Rastaborg och Nyckelby 1946-55. (**Storage of cabbage. Trials at Rastaborg and Nyckelby 1946-55.**) [English and Esperanto summaries 1½ pp. each.]

Medd. Trädgårdsförs. Malmö **111**, 1958, pp. 23, bibl. 5.

Several late varieties of white cabbage were stored in cellars (with regulated temperature) or in pits. Losses during storage were high at temperatures above 0-5°C. Loss of weight was, in general, slight, but it was greater with early than with later varieties. Treatment with Fusarex or Brassicol did not noticeably reduce storage losses; KP2 showed some promise in reducing rotting. Yields were not affected by application of MH (0.25-1%) 2-6 weeks before harvest, and storage behaviour was not improved. There was a tendency for greater losses by rotting after MH treatment.

Celery.

(See also 559d.)

425. WESTGATE, P. J., FORBES, R. B., AND SCUDDER, W. T.

Improvement on cultural practices for cabbage, lettuce, celery, and other vegetable crops.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 180-1.

Three levels of sodium nitrate, superphosphate and potassium chloride were applied to celery plots and the following effects were noted: N gave the highest yield response, except at an excessive rate when yields were curtailed; blackheart increased with increasing N, but was not markedly affected by P and K. Celery and cabbage were grown in concrete tanks in the field with controlled water levels, and larger yields of both crops were obtained with a water level 16 in. below the soil surface than with water levels at 26 and 40 in.

426. YAMAGUCHI, M., HOWARD, F. D., AND MINGES, P. A.

Brown checking of celery, a symptom of boron deficiency. III. Effects of potassium, nitrogen and boron in culture solutions on the physiological disorder and nutrient uptake.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 455-67, bibl. 14, illus.

The effects of various levels of B, N, K and Ca on brown checking and cracked stem of Utah 10-B celery were studied in sand culture. The effects of high K and low B were significant, but Ca had little or no effect. The effect of N was significant early in growth and with low (0.1 p.p.m.) B in the nutrient solution. Summer Pascal also showed slight symptoms at high K and low B. Chemical

analyses showed that the Ca and Mg contents of petioles were significantly lower in plants grown in nutrient solutions high in N or K. Two foliar spray applications containing 1.5% boric acid corrected deficiency symptoms in both Utah 10-B and Summer Pascal. [For parts I and II, see *H.A.*, 27: 3454 and 3455.]—Univ. Calif., Davis.

427. NELSON, R.

Influence of gibberellic acid on susceptibility of celery to early and late blight.

From abstr. in *Phytopathology*, 1958, **48**: 396.

Celery plants sprayed 3-5 weeks before normal field maturity with solution containing 20-50 p.p.m. gibberellic acid appeared more susceptible to early blight (*Cercospora apii* Fres.). Copper or carbamate sprays or dusts failed to protect against infection by *Cercospora apii* if plants had been sprayed with gibberellic acid before inoculation. Plants sprayed with 50 p.p.m. gibberellic acid 3 weeks before inoculation with *Septoria apii-graveolentis* developed significantly more lesions than comparable inoculated plants sprayed with water.

428. VAN NOSTRAN, F. E.

Effects of fungicide combinations on control of celery early blight.

Plant Dis. Repr., 1958, **42**: 1107-10, bibl. 3.

Dyrene (2,4-dichloro-6-(*o*-chloroanilino)-s-triazine) plus Tribasic Copper Sulfate, and Dyrene plus Parzate (zineb; wettable powder) were additive in their effects on the control of celery early blight (*Cercospora apii* Fres.). Tank mix zineb (nabam plus zinc sulfate) gave significantly better control of the disease than did pre-prepared zineb (Parzate; wettable powder) at an equivalent concentration. [Author's summary.]—Everglades Exp. Stat., Univ. Fla, Belle Glade.

429. DARBY, J. F.

Control of damping-off and root rots of vegetable crops.

A.R. Fla agric. Exp. Stats 1956-57, p. 185.

The application of 250 gal. per acre allyl alcohol and 25 gal. per acre 83% emulsifiable EDB in water, through an underground tile system 22-24 in. below the surface of a celery seedbed, greatly improved nematode control, increased quantity and quality of celery seedlings, and reduced the time that the plants were in the seedbed by 2 weeks. Supplementary application of surface drenches containing allyl alcohol controlled weeds and grasses near the surface which were not controlled by the underground method of application.

Cucurbits.

(See also 558d, 1.)

430. THOMPSON, B. D., AND NETTLES, V. F.

Effect of culture and environment on the production of cantaloupes.

A.R. Fla agric. Exp. Stats 1956-57, pp. 164-5.

When 4 cantaloupe varieties were grown under conditions of severe *Alternaria* leaf-spot disease incidence, the highest number of marketable fruits was produced by PMR45. In a factorial experiment, in which 3 levels of N, K₂O and MgO were applied in spring to PMR45, no significant results were obtained, but the following trends were apparent: high levels of K₂O were not effective at any level of MgO unless N was present, and N levels were not effective at a high rate of K₂O fertilization in the absence of Mg; yields were continuing to increase at the highest levels of application of all 3 elements; no effects of fertilizer were apparent on fruit size, shape, netting, flesh colour, texture or flavour.

431. RODRÍGUEZ LÓPEZ, M.

Parthenocarpia provocada en especies del género *Cucurbita*. (*Parthenocarpia* induced in species of *Cucurbita*.)

Bol. Inst. nac. Invest. agron. Madrid, 1958, 18: 265-70, bibl. 9, illus.

Flowers of *Cucurbita ovifera* and *C. maxima*, grown in the open, were sprayed 24 hr. before anthesis with α -naphthylacetic acid (NAA) or β -naphthoxyacetic acid at 50 and 100 p.p.m. each. With *C. ovifera* 50 p.p.m. β -naphthoxyacetic acid was most effective, 60% of the treated flowers giving seedless fruits which were slightly smaller than the control. At 100 p.p.m. only 35% parthenocarp was obtained and some fruits withered after they had begun to swell. With NAA only 15% parthenocarpic fruit set was obtained and many fruitlets aborted. With *C. maxima* treatment resulted in smaller fruits, but the mesocarp was better developed. The highest percentage of parthenocarpic fruit set, i.e. 55%, was obtained with NAA; β -naphthoxyacetic acid, especially at 100 p.p.m., caused abortion of fruitlets.

432. MASUDA, T., AND HAYASHI, K.

Verrucae [warts] on melon fruits. I. The artificial formation of verrucae and anatomical observations thereon. [Japanese, with English summary $\frac{3}{4}$ p.]

Sci. Rep. Fac. Agric. Okayama Univ., 1958, No. 11, pp. 79-86, bibl. 7, illus.

Warts were produced artificially on the surface of honeydew melons by rubbing a spot lightly and then keeping the fruit in a dry atmosphere. No blemish occurred if the rubbed fruit was kept in a humid atmosphere. The anatomical structure of the warts is described. J.R.L.

433. MILLER, C. H., AND OTHERS.

Some factors influencing pickling cucumber production.

Proc. Amer. Soc. hort. Sci., 1958, 71: 468-74, bibl. 7.

Yields and stands of 2 cucumber varieties were reduced by applications of a 5-20-20 fertilizer at

rates of 150-200 lb. or more per acre broadcast, side-placed or placed 2 in. under the seed. The highest yields were obtained on plots receiving side-placed applications of 100 lb. per acre of 5-20-20. The variety Wisconsin SMR-12 produced markedly higher yields with a low broadcast application, and with a high under-the-row application than did Wisconsin 18-7. In fresh cucumber petioles P increased as N decreased throughout the season, and Mg increased sharply as the season progressed. High yields were associated with soils having abundant soluble N and P.—Mich. St. Univ., E. Lansing.

434. MILLER, C. H., AND RIES, S. K.

The effect of environment on fruit development of pickling cucumbers.

Proc. Amer. Soc. hort. Sci., 1958, 71: 475-9, bibl. 6, illus.

Two varieties of pickling cucumber were grown in soil cultures with 2 levels of N, 2 night temperatures and 2 daylengths. Plants receiving the high N level produced 3 times as many fruits as did the low N plants. The length: diameter ratio of the fruits was increased by high N and by low night temperatures (60° F.). Plants grown at 70° F. night temperature produced more fruit in 11-hour days than in 15-hour days, whereas at 60° F. night temperature more fruit was produced under long-day conditions. Daylength did not affect the length: diameter ratio of the fruits.—Mich. St. Univ., E. Lansing.

435. BRANTLEY, B. B., AND WARREN, G. F.

The effect of nitrogen, photoperiod and auxin on sex expression in the muskmelon.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xix.

The effect of 20, 100 and 300 p.p.m. of N, and 0.01, 0.1 and 1 p.p.m. of NAA under 8 and 16-hour photoperiods on flower ratio was studied. High N, long days and NAA were found to promote female sex expression.—Purdue Univ., Lafayette.

436. HOFFMAN, J. C.

The effect of carbohydrate and of nitrogen deficiency upon growth, flowering, fruit setting and development of the male and female gametophytes of muskmelon, *Cucumis melo* L.; pepper, *Capsicum frutescens* L.; and lima bean, *Phaseolus lunatus* L.

Diss. Abstr., 1958, 18: 744-6, being Publ. 24,520 of 169 pp.

Abscission before and after anthesis of staminate and bisporangiate flower buds of muskmelon was associated with, if not caused by, carbohydrate deficiency; N deficiency had only a slight effect. Carbohydrate deficiency had a more adverse effect on the development of the male gametophyte than had N deficiency. Carbohydrate deficiency was usually associated with aborted pollen grains; in

Capsicum the percentage of visibly aborted grains was often high under conditions of severe N deficiency. Germination of pollen from carbohydrate-deficient plants was rather lower than from N-deficient plants. Carbohydrate and N deficiencies both reduced the size of muskmelon bisporangiate flower buds before anthesis. A greater percentage of total flower buds abscised before anthesis with N-deficient *Capsicum* plants than with carbohydrate-deficient plants. Nitrogen deficiency adversely affected the development of female gametophytes of muskmelon and *Capsicum*, and with extreme N deficiency practically no muskmelon fruits developed. Both N and carbohydrate deficiency affected fruit set and development of *Capsicum*. After removal of the mature fruit of *Capsicum*, new growth was initiated and a considerable number of new flower buds reached anthesis. Fruits from N-deficient and localized carbohydrate-deficient Hearts of Gold muskmelon plants showed signs of abscission 8 days after anthesis, when 100% of the ovules were fertilized. This indicated that development of the muskmelon ovary was not primarily associated with fertilization, but with a direct carbohydrate-N relationship within the plant.

Abscission of pepper ovaries and young fruits 4 days after anthesis was usually associated with a lack of fertilization, resulting from degeneration of pollen tubes within the pistil. Incomplete fertilization 6 days after anthesis was very pronounced in both carbohydrate and N-deficient *Capsicum* plants. The size of Honey Dew muskmelon fruit from carbohydrate-deficient plants was not associated with the amount of normal seed development, but with the total number of ovules present which later developed either as viable or non-viable seed.

437. SANJEEVA RAJ, P. J.

Bat guano—good for musk-melons.

Indian Hort., 1958, 2 (2): 6.

Sidhout is the chief centre of musk melon culture in Andhra Pradesh. The fruit produced in this region is of exceptionally good flavour and the flesh and peel are firmer than in other districts, allowing the fruit to be marketed without damage. These qualities are attributed to the use of bat guano as a fertilizer. Methods of culture are described.

438. CONOVER, R. A.

Control of cantaloupe diseases.

A.R. Fla agric. Exp. Stats, 1956-57, p. 352.

Excellent control of downy mildew (*Pseudoperonospora cubensis*) was obtained with zineb and Phaltan, but poor control with streptomycin. *Alternaria* (thought to be *Alternaria cucumerina*) and gummy stem blight (*Mycosphaerella citrullina*) became prevalent in streptomycin-sprayed plots. Actidione S at 5 and 10 p.p.m. was the most

effective of the antibiotics tested for control of powdery mildew (*Erysiphe cichoracearum*), and was better than zineb under conditions of severe infestation.

439. AKAI, S., YASUMORI, H., AND TERAZAWA, H.
On the resistance of cucumber varieties to anthracnose and the behavior of the causal fungus in the invasion of the host tissues.

Plant Dis. Repr., 1958, 42: 1074-9, bibl. 4.

Japanese cucumber varieties varied greatly in susceptibility to *Colletotrichum lagenarium*; squash varieties were all resistant.

440. DARBY, J. F., AND WILSON, J. W.

Synthetic insecticides and fungicides for vegetable crops in central Florida.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 182-3.

Excellent control of downy mildew [*Pseudoperonospora cubensis*] of cantaloupes was obtained with maneb (1.5 lb. in 100 gal.), Cop-O-zinc (3 lb. in 100 gal.), Thioneb (1.5 lb. in 100 gal.), and maneb/Cop-O-zinc mixture (1 lb. plus 2 lb. in 100 gal.), all applied 11 times. Submerging cantaloupes in a solution containing tribasic copper sulphate (3 lb. in 100 gal.) and streptomycin sulphate (100 p.p.m.) reduced the percentage of fruit rots (*Pellicularia rolfsii* and an unidentified bacterium) from 49.1% to 21.2% after 3 days storage at room temperature. Painting the stem scars with a paste containing copper sulphate (50 lb. in 100 gal.) and streptomycin sulphate (1,000 p.p.m.) reduced rotted fruit from 49.1% to 20.7% after 3 days, but also caused slight tissue injury.

441. FERNANDO, H. E.

The biology and control of *Leptoglossus membranaceus* Fabricius (Fam. Coreidae Ord. Hemiptera).

Trop. Agriculturist, 1957, 113: 107-18, bibl. 15, illus.

L. membranaceus is a pest of cucurbits, especially bitter-gourd (*Momordica charantia*), and of citrus. Seven dust formulations of 5 chlorinated hydrocarbon insecticides were tested at 20 lb. per acre, but only 1.3% and 3% gamma BHC dusts gave effective control. Re-infestation of the dusted plots occurred within 8-10 days. J.R.L.

442. SHOWALTER, R. K.

Watermelon damage from field to car loading.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 101-2.

Splitting at harvest of 15 lots of melons varied from 5 to 80%, and in those which split contents of soluble solids were lower. Blackstone was more susceptible to splitting than the other varieties. A significant correlation was found at harvest between soluble solids and specific gravity in all

varieties. Melons with hollow heart had a lower specific gravity than those without, and hollow heart was easily observed on X-ray film.

443. HALL, E. G., AND SCOTT, K. J.

Ripening of honeydew melons.

Food Pres. Quart., 1958, **18**: 32-3.

Treatment with ethylene gas for 48 hr. or longer did not cause all the melons treated to ripen evenly and to develop characteristic texture and flavour. However, exposure to ethylene gas (1:1,000) for 3-4 days in a commercial ripening room at 65-70° F. hastened ripening, reduced the period over which most fruit matured and improved the quality of ripe fruit sufficiently to make treatment worth while. It is suggested that uneven ripening after long periods of exposure to ethylene indicates a variation in maturity of the picked fruit. —C.S.I.R.O., Homebush, and Dep. Agric., N.S.W. J.R.L.

444. USATJUK, M. K.

The storage and processing of watermelons.
[Russian.]

Sad i Ogorod, 1958, No. 9, pp. 35-7.

Watermelons of suitable varieties can be kept for 2-3 months or longer. They can be stored in single layers on shelves or in boxes lined with corrugated paper, or on barn floors in heaps 3 layers deep between straw or chaff. The best storage conditions were found to be 3-4° C. and 80-85% relative humidity. Lower temperatures impaired quality. Watermelons are also preserved in brine or in sand and brine, or they can be pickled.

Legumes.

(See also 15, 17-19, 27, 28, 31, 32, 38, 44, 45, 51, 52, 54-57, 60, 70q, 311t, 558g, j, o, p, 559e, g, j, k, p, u, v.)

445. ROUX, A.

Sortenypische Merkmale an den Blüten von Gemüseerbsen. (Characters typical of the variety in the flowers of green peas.)

Züchter, 1958, **28**: 203-9, bibl. 5, illus.

In 3 years' measurements of pea flowers it was found that varietal differences exist in the size of flowers and in the shape of the standard and wing petals and of the two upper sepals. The shape of the base of the standard and the shape and size of the two upper sepals proved particularly useful means of identifying a large number of varieties.

446. NORTH, C., FRITH, L. H., AND TAYLOR, H.

The assessment of yield in canning-pea varieties in Scotland.

J. hort. Sci., 1958, **33**: 237-43, bibl. 11.

As a result of variety trials over a period of 6 years at the Scottish Horticultural Research Institute, Invergowrie, a satisfactory trial procedure has been evolved, although peas are still considered the

most time-consuming and expensive vegetable to test. The texturemeter was found to be an insufficiently accurate instrument for determining the harvest date of canning peas under Scottish conditions of slow maturation. It may, however, be a useful adjunct to the tedious Alcohol Insoluble Solids test for a preliminary determination of maturity. The results of yield trials with 7 varieties of canning pea are reported.

447. REYNOLDS, J. D.

Trials of Dutch threshed pea varieties: 1949-1952.

J. nat. Inst. agric. Bot., 1957, **8**: 82-95, bibl. 9.

Results are presented of 41 trials carried out in a number of localities for 4 seasons to compare the yield and quality of the Dutch threshed pea varieties Servo, Unica, Rondo, Mansholt's G.E.K., Stijfstro, Emigrant and Zelka. The field characteristics of each variety are described. Servo consistently gave the highest yields (average of 25.3 cwt./acre); Rondo yielded as well as Servo in 1949 and 1950 but not so well in 1951. Zelka and Mansholt's G.E.K. gave the lowest yields, and Unica, Emigrant and Stijfstro were intermediate. Soil type did not greatly affect the relative yielding capacities of the varieties, but on the more fertile soils Servo gave better actual and percentage yields than other varieties, indicating that the choice of variety is more important on a fertile soil. Zelka and Emigrant had the firmest texture when canned as "processed peas".—N.A.A.S.; *Nat. Inst. agric. Bot.*, and Pea Growing Res. Org. Ltd., Yaxley, Peterborough. [See also *H.A.*, 28: 2717v.] J.R.L.

448. DE ARRUDA, H. V.

Correlação entre o peso da planta e o das sementes, em variedades de feijoeiros. (Correlation between plant weight and seed weight in varieties of beans.) [English summary 5 lines.]

Bragantia, 1957, **16**: 385-8, bibl. 3.

A statistical study with 9 varieties of beans showed a highly significant correlation between the weight of stems plus leaves and the weight of seeds produced. The regression coefficient (b)=0.34.

449. BRIGGS, R. E.

Studies on the germination and early growth of peas (*Pisum sativum* L.).

Diss. Abstr., 1958, **19**: 199-200, being *L.C. Card No. Mic* 58-2552 of 152 pp.

Graded and ungraded seed of several pea varieties was grown in sterile silica sand at 15° C. or 20° C. for 16 days. Emergence data indicated that the varieties which emerged most rapidly were not always those which matured earliest. There were considerable variations in characteristics within the varieties, regardless of seed lot or temperature. A high correlation existed between length of the

fourth internode and stem length for both temperatures and lots. Dry weight of vine growth was highly correlated with dry weight of root growth, but stem length was not correlated with root length. In studies on the effect of 3 germination temperatures (10° C., 15° C. and 20° C.) the dry weight of the seed was found to be highly correlated with dry volume (based on water displacement). After 3 days germination at 10° and 15° C., and after 2 days germination at 20° C. the smooth-seeded varieties had the least volume increase. Germination temperatures did not significantly affect final stem length.—Univ. Wisconsin.

450. ZIVER [M.], A., AND MORENO, O.
Grado de poder germinativo en porotos.
(Level of germination capacity in beans.)
[English summary $\frac{1}{2}$ p.]
Agric. téc. Chile, 1956, **16**: 92-6 [received 1958].

Of 4 runner bean varieties tested in both field and greenhouse, percentage germination was highest in Red Kidney and lowest in Arroz. Germination was earliest in Red Kidney and latest in Coscorrón. The variety Cristal Bayo was second in percentage, and differed little from Arroz in speed of germination.

451. ALLERUP, S.
Effect of temperature on uptake of water in seeds.

Physiol. Plant., 1958, **11**: 99-105, bibl. 14.

The uptake of water by seeds of peas and other crops was determined as a function of time at temperatures of 5, 15, 25 and 35° C. The rate of water uptake decreased with time, except in peas at 5° C., when the curve for water uptake was S-shaped. The effect of temperature on the uptake of water varied with time, i.e. with the water content of the seeds. The effect of temperature cannot be attributed to a change in the viscosity of the water.—Roy. vet. agric. Coll., Copenhagen.

452. VITNUM, M. T., AND OTHERS.
Effect of variable row spacings and plant populations on peas grown for processing and on the subsequent crop of alfalfa.

Agron. J., 1958, **50**: 577-80, bibl. 6.

Seed was sown in 7-inch spaced rows at (a) the normal rate of 337,000 plants per acre, (b) half normal, by doubling the spacing of rows, (c) $\frac{2}{3}$ normal by adjusting row spacing, and (d) $\frac{2}{3}$ normal by reducing row density. The higher the seeding rate, the higher was the yield per acre and the lower was the yield per plant. Maturity was unaffected by spacing, but seed size was significantly reduced in (b). Yields of the succeeding lucerne crop were inversely related to pea population and yield but differences were statistically significant only for the first cut, and were not sufficiently important to justify reduction of the sowing rate for peas.

453. BARBER, H. N., AND OTHERS.
Gibberellic acid and the physiological genetics of flowering in peas.

Nature, 1958, **182**: 1321-2, bibl. 5.

The interaction between gibberellic acid and the effects of the *Sn* gene (dominant for late flowering) and the *Le* gene (dominant for tallness) was studied in 4 varieties of pea. GA delayed initiation of flowering in all varieties by 1-3 days, and also caused considerable abortion of flower rudiments. There was a statistically significant interaction between *Le* and GA, the effect of the acid on flowering being less in tall than in dwarf varieties. There was some evidence that in *Sn* plants GA treatment followed by vernalization may increase the effect of photoperiod, whereas vernalization without GA treatment reduces the photoperiodic response. GA, like the *Sn* gene, delayed the production of leaves with more than 2 leaflets. It has been suggested [see *H.A.*, 22: 2588 and 26: 607] that the *Sn* gene exerts its effect by producing a hormonal substance which delays the initiation of flowers and which is destroyed during long days and at low temperatures. The fact that GA affects 3 of the characteristics pleiotropically controlled by the *Sn* gene (position of first flower, leaf type and internode length), and may possibly alter the size of the photoperiodic effect, indicates that the *Sn* gene is probably working, like the *Le* gene, by way of some aspect of the gibberellic metabolism of the plant. It is clear that GA is not the flower-inhibitor produced by the *Sn* gene, but the production of the flower inhibitor may be linked to gibberellin metabolism either by way of a common precursor or more indirectly by a reaction involving the production and utilization of the gibberellins.—Univ. Tasmania, Hobart.

454. BONDE, E. K., AND MOORE, T. C.
Effects of gibberellic acid on the growth and flowering of Telephone peas.

Physiol. Plant., 1958, **11**: 451-6, bibl. 14.

Single sprays of increasing concentrations of gibberellic acid (GA) in the range of 0.0015 to 15.0 mg./l. have increasing stimulatory effects on the stem elongation of dwarf Telephone peas. Height increases at all concentrations were greater in plants treated at 20 days than in those treated at 10 days of age. In contrast, fresh and dry weight increases were greater in plants sprayed at 10 days than at 20 days at the two highest concentrations but not at the lower ones. The time required to flower in the dwarf Telephone pea was not affected by GA treatment. However, increasing concentrations of GA increased the number of nodes to the first flower to a maximum increase of 2 nodes at the highest concentration. Fifteen mg./l. had no effect on flowering in the tall variety. A spray of a given concentration applied at 20 days of age was less effective than one applied at 10 days in chang-

ing the number of nodes to flower in a group of plants. [Authors' conclusion.]—Univ. Colorado, Boulder.

445. BIGGS, R. H.

Physiological basis of abscission in plants.

Diss. Abstr., 1958, 19: 202, being *L.C. Card No. Mic 58-1759* of 137 pp.

Sucrose stimulated abscission in excised abscission zones of beans, which were low in endogenous substrates and kept in the dark, and inhibited abscission at high concentrations in all but the older explant substrates. NAA promoted abscission at low concentrations within a wide variety of conditions and ages. Abscission was not promoted with young explants in darkness, nor with older explants which had a low carbohydrate reserve, unless substrate was added. [See also *H.A.*, 28: 2084.] Ethylene was found to have a quantitative effect on abscission. An abscission accelerating factor was produced in the leaves with age, and the production of this factor was increased by adverse conditions which normally accelerate abscission. Gibberellic acid accelerated abscission but not to the same extent as auxin. In tests with defoliant there was no relation between the degree of leaf burning and abscission. Most materials tested removed the inhibitory effect of living leaf tissue, but endothal also had a direct accelerating effect on the abscission processes.—Purdue Univ.

446. ATTIA, M. S.

Effect of some cultural and fertilizer treatments on the early and total yields of two varieties of peas for fresh market. [Arabic summary $\frac{1}{2}$ p.]

Ann. agric. Sci. Cairo, 1956, 1 (2): 213-19, bibl. 5 [received 1958].

Little Marvel and Feltham First peas were grown either in single rows on ridges 2 ft. apart or in double rows on raised beds 3 ft. apart, both with and without phosphatic fertilizer. The yield early in the season was the same for both varieties but a greater total yield was obtained from Little Marvel. The cultural methods and fertilizer applications had no significant effect on yield.—Veg. Res. Stat., Dokki. J.R.L.

447. COWETT, E. R., AND MURPHY, H. J.

Anhydrous ammonia and nitrogen solutions for Maine crops.

Maine Fm Res., 1958, 6 (2): 33-5.

In trials with row crops, including snap beans, anhydrous ammonia was equally effective when placed in the soil in 1 or 2 bands, when used as the total N supply, or when used with a starter solution. Similar results were obtained with a N solution, Uran-32. Uran-32 was also as effective when applied on the soil surface as when banded into the row. In most cases anhydrous ammonia was superior to other N materials for side-dressing snap beans.

448. SCHÜTTE, K. H., AND SCHENDEL, H. E.

Influence of trace elements upon plant protein composition.

Nature, 1958, 182: 958-9, bibl. 9.

Results of a preliminary investigation indicated that beans grown in a Cu-deficient medium have a higher concentration of threonine and perhaps a lower concentration of valine in their protein than normal, whereas beans grown in a Zn-deficient solution have proteins with a very low level of glycine and perhaps of iso-leucine.—Univ. Cape Town.

449. CSATÁRI-SZÜTS, K.

A bab tápanyagigényének vizsgálata. (The nutrient requirements of beans.) [Russian and German summaries 8 lines each.]

Kert. Kut. Int. Évk. 1957, 2: 3-9, bibl. 15.

Experiments with beans conducted from 1954 to 1957 have shown that: 1. Ploughing in 200 centners [=approx. 10 t.] per cadastral hold [=1.42 ac.] F.Y.M. in the autumn appreciably increased the yield of both green pods and seeds. 2. When N, P and K were added to the F.Y.M. the content of humus in the manure had a greater effect on yield increase than that of the minerals. 3. The addition of minerals to the organic fertilizer can only increase yields further when adequate organic matter is present in the soil.

440. ARANGO BONILLA, H.

Algunas enfermedades del frijol (*Phaseolus vulgaris* L.) en el Valle del Cauca. (Some diseases of the bean (*Phaseolus vulgaris*) in the Cauca Valley area.) [English summary 1 p.]

Acta agron. Palmira, 1958, 8: 1-75, bibl. 179, illus.

A thesis, dealing with:—the leaf fungi powdery mildew (*Erysiphe polygoni*), rust (*Uromyces phaseoli typica*), angular leaf spot (*Isariopsis griseola*), and cercospora leaf spot; the bacterial blights *Pseudomonas phaseolicola* and *Xanthomonas phaseoli*; also mosaic virus, and "snake head", which is caused by mechanical injury to the seeds during removal from the pods. In each case current control measures are outlined.

441. AFANASIEV, M. M., AND SHARP, E. L.

Effect of various bactericidal sprays on control of halo blight disease of garden beans.

Plant Dis. Repr., 1958, 42: 1071-3, bibl. 3.

In spraying trials with 5 chemicals bordeaux mixture gave outstanding control of *Pseudomonas phaseolicola* in a season of severe infection. In a season of mild infection several of the compounds were effective. These included Agrimycin at 50 p.p.m., but this concentration was inadequate under conditions of severe infection. Yields of beans were inversely proportional to the amount of defoliation caused by halo blight.—Mont. agric. Exp. Stat., Bozeman.

462. CÁRDENAS C., H.

Persistencia de la acción protectora de varios fungicidas en el frijol (*Phaseolus vulgaris* L.). (Persistence of the protective action of various fungicides on beans (*Phaseolus vulgaris* L.)) [English summary $\frac{3}{4}$ p.] *Acta agron. Palmira*, 1958, 8: 77-100, bibl. 13, illus.

Spores of *Isariopsis griseola*, and bean plants inoculated with the spores to induce angular leaf spot, were treated with Fermate, Fuklasin, Manzate, Parzate (disodium ethylene bisdithiocarbamate), Orthocide 50 (a captan product), Thilate (thiram) and 2 copper fungicides, with and without a diethyleneglycol spreader-sticker, a vinyl resin sticker, and an endrin-type insecticide. Spore germination *in vitro* was high in all treatments, even when the fungicides were used at 3 times the concentration commercially recommended. The vinyl resin and the insecticide each showed a slight fungicidal action. In a field experiment with severe induced infection, the protective power was low in all the fungicides and decreased slightly from the 3rd to the 9th day. In a second experiment with slight infection, Fermate remained active for 9 days and the other products for 7 days. The water content and luxuriance of the bean leaves appeared to be increased by Parzate, Manzate and Fuklasin, and reduced by Thilate and the copper products. The use of a moist chamber enhanced the success of inoculation, but at R.H. 34-84%, the formation of smaller and less succulent leaves afforded partial resistance.

463. WILSON, E. M., AND ARK, P. A.

The effect of chlorophyll on the phytotoxicity of Acti-dione on bean.

Plant Dis. Repr., 1958, 42: 1069-70, bibl. 1.

The phytotoxicity of 10 p.p.m. Acti-dione (cycloheximide) to Pinto and Bountiful beans was reduced by the addition of water-soluble chlorophyll. Injury became less as the amount of chlorophyll was increased, until at 1,000 p.p.m. of chlorophyll there was no injury. The addition of chlorophyll did not appear to reduce the protective activity of Acti-dione against powdery mildew (*Erysiphe polygoni*), nor in culture tests did it cause an appreciable reduction in the inhibiting effect of Acti-dione on *Saccharomyces cerevisiae*.—Univ. Calif., Berkeley.

464. COSTA, A. S.

Definhamento e necrose do feijoeiro causados por tinta a óleo comercial. (Decline and necrosis of beans caused by commercial oil paint.) [English summary 10 lines.]

Bragantia, 1957, 16(Suppl.): v-ix, illus.

Severe stunting of growth and necrotic streak of leaf veins, petioles and stems, developed in experimental bean plants grown in aluminium pots which had been coated with white paint. The symptoms

were reproduced in bean plants grown in earthenware pots filled with soil to which solids from the paint had been added. The presence of stunt increased the resistance of the plants to tomato spotted wilt and tobacco streak viruses. The toxic effect of the paint was most evident during winter. The presence of linseed oil stimulated the production of numerous superficial roots with abnormal geotropic responses.

465. CONOVER, R. A.

Control of rust on pole beans.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 351-2.

Under conditions of severe rust infection (*Uromyces phaseoli typica*), the best control was obtained by twice-weekly applications of maneb [see also *H.A.*, 27: 2452], and weekly applications of CP10512. Marginal and interveinal chlorosis occurred in plots sprayed weekly with CP10512.

466. RAO, D. K., AND RAO, P. G.

Powdery mildew disease of clusterbean (*Cyamopsis tetragonoloba* Taub.) and the effect of certain fungicides on its control.

Sci. and Cult., 1958, 24: 137-9, bibl. 2.

The disease, caused by *Oidium* sp. is described. Five common fungicides gave good control, the most effective being bordeaux mixture, 5-5-50 at 200 gal. per acre.

467. (STONE, M. W., AND FOLEY, F. B.)

Stop lygus on limas.

Agric. Res. Wash., 1958, 7 (3): 16.

Effective control with DDT depended on its timely application, either just after blossoming or 2 weeks later when the pods appeared. Later applications were less effective.

468. THOMPSON, J. A.

Bulk shipping of Navy beans.

Agric. Mktg., 1958, 3(8): 5, illus.

The bulk handling of beans from producing area to cannery is proving more satisfactory than movement in bags. Beans are delivered into railway trucks through canvas sleeves to avoid impact damage. Moisture control is essential to avoid mould damage. Sampling is easier and loading time is reduced by nearly 75%.

Mushrooms.

(See also 558v, w, z.)

469. GROVES, J. W.

Mushroom collecting for beginners.

Publ. Canada Dep. Agric. 861, revised 1958, pp. 30, illus.

Descriptions accompanied by illustrations are given of 13 edible mushroom species and of 3 poisonous and 1 inedible species. The species described are all common in Canada and should be easy to recognize if the bulletin is read with due care.

470. LEGRAND, G., AND MARTIN, G.

La laccase acide des champignons supérieurs. Relation entre la présence de cet enzyme et les conditions de développement chez *Agaricus campestris*. (Acid laccase in higher fungi. Relation of the presence of this enzyme to conditions of development in *Agaricus campestris*.) [English and German summaries $\frac{1}{2}$ p. each.] *Qual. Plant. Maveg.*, 1958, 3/4: 521-8, bibl. 11.

The pH optimum for laccase varied with the substrate. For commercially grown mushrooms under ordinary conditions it was 6.5-7.0, but in certain synthetic acid substrates it became 5.6, indicating the presence of an acid laccase. Below pH 5.2 laccase secretion was markedly reduced and below pH 4 mycelial growth ceased.—Lab. Chim. agric. biol., Paris III.

471. HOFFMAN, I. C., AND HUNT, C. H.

Effect of supplementary B-complex vitamins on yields and vitamin content of mushrooms. *Res. Bull. Ohio agric. Exp. Stat.* 815, 1958, pp. 27, bibl. 18, illus.

The use of B-complex vitamins in water solutions, or of supplementary organic materials high in B-complex vitamins, was shown to extend the heavy cropping season of mushrooms from 8-10 weeks to 12-14 weeks and to increase yields by about 30-50%. It is recommended that the first application be made before the bed is cased followed by applications at weekly or 10-day intervals during cropping. The vitamins and supplementary organic materials used, alone and in combination, are specified. Their addition to the compost was found to be profitable. The effect of the vitamins on mushroom yield is probably due to the exhaustion of these constituents in the medium after the first flushes.

472. GORŠKOV, L., AND KLJUŠKINA, N.

The use of peat for mushroom growing. [Russian.]

Sad i Ogorod, 1958, No. 8, pp. 26-7.

Yields of mushrooms in kg. per sq. m. were 10.105 from horse manure, 8.640 from peaty cattle manure covered with horse manure, and 7.603 and 7.225 from 2:1 mixtures of horse manure and highland and lowland peat respectively covered with horse manure. Horse manure and peat mixtures at 1:1 without manure cover were less satisfactory.

473. EDDY, B. P.

Production of mushroom mycelium by submerged cultivation.

J. Sci. Food Agric., 1958, 9: 644-9, bibl. 13.

Studies were made on the yields and flavour of mycelium of 21 species of edible fungi and 8 strains of cultivated mushrooms grown on various

nutrient culture media. Yields of some species were satisfactory but flavour, when present, was generally weak. *Coprinus comatus* produced a strong mushroom-like flavour when grown on the surface of a liquid medium but not when the same medium was used in a fermenter. Methods for the enhancement of flavour of mycelium after harvesting have been unsuccessful.—Low Temp. Stat. Res. Biochem. Biophys., Univ. Cambridge, and D.S.I.R.

Onions and allied crops.

(See also 67, 558b, n.)

474. CORRALES M(ACEDO), A.

Comparativo de variedades de cebollas. (Comparison of onion varieties.)

Inf. mens. La Molina, 1958, 32 (369): 19-26, illus.

Sowing dates are recommended for the 7 most promising imported varieties of onion out of 15 which were compared with the local Peruvian variety. White varieties were easily damaged during transport.

475. SCOTT, F. M., AND OTHERS.

Electron microscope studies of the epidermis of *Allium cepa*.

Amer. J. Bot., 1958, 45: 449-61, bibl. 16, illus.

The structure of the epidermis of the leaf and root of the onion, as seen under light and electron microscopes, is described. Ultrasonic treatment effectively macerates the tissues and the fragments are mounted on electron microscope grids. The tabular epidermal cells of leaf and root are pitted on all cell faces including the outer wall. Wax rodlets coat the conspicuous cuticle of the leaf, while mucilage ensheaths the thin, but clearly defined, cuticle of the root. Wax and mucilage precursors, in fluid form, presumably extrude along the plasmodesmata through the pits in the outer wall. Failure to detect transcurrent wax or mucilage canals in cuticle may be due to the natural shrinkage and artifact dehydration of this membrane during preparation. [Authors' summary.]—Univ. Calif., Los Angeles.

476. DE OLIVEIRA, V. G.

Cultura de cebolla (*Allium cepa* L.) por meio de bulbinhos. (Growing onions (*Allium cepa*.) from sets.) [English summary 9 lines.] *Bragantia*, 1957, 16: 101-7.

In São Paulo State, Brazil, storage rots caused approximately 50% loss in onion sets harvested in September to November from March and April plantings. By planting early in August, September or October and shortening the growing period to 3 months, storage losses were reduced to approximately 11% for the first 2 plantings, and in the last planting only 8.7% of medium-sized and none of

the top-sized sets rotted. August planting gave the highest yield and largest average size of sets, and September planting gave the greatest number, but smallest average size. The sets were divided into 4 size categories, and maxima being 15 mm., 25 mm., 35 mm. and 40 mm. respectively, planted the following March with a spacing of 20×50 cm., and harvested in June. The larger the sets, the higher were the total number and weight of bulbs harvested, but the 25–35 mm. category proved the most profitable economically.

477. JONES, S. T., AND JOHNSON, W. A.
Effect of irrigation at different minimum levels of soil moisture and of imposed droughts on yield of onions and potatoes.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 440-5, bibl. 8.

The highest yields of onions were obtained by irrigating when the soil moisture tension reached 0.3 atmosphere (about 80% total available moisture capacity). Irrigation at soil moisture tensions between 0.3 and 0.6 atmosphere is recommended. Drought periods occurring early in the season were less detrimental than those occurring later.—Alabama Polytech. Inst., Auburn.

478. OGATA, K., AND MURATA, T.
Studies on the storage of onions. (8) On a functional disorder of onion bulbs.

J. hort. Ass. Japan, 1958, **27**: 111-15, bibl. 19.

In bulb tissue injured by fungal infection or chemical treatment there was an accumulation of ethyl alcohol and acetaldehyde and a reduction in total sugar content. Respiration and activity of catalase and peroxidase increased to a peak in disc tissue, and then fell much below normal. Acetaldehyde inhibited the activity of dehydrogenase in the disc tissue.

479. BURGIS, D. S., AND OVERMAN, A. J.
Soil treatment for the production of field-seeded vegetables on sandy soil.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 308-11.

Onions: Allyl alcohol, Crag Mylone and Vapam were applied before sowing, and, although there was no evidence of post-emergence damping-off, germination counts taken 18 days after sowing showed that Vapam and Crag Mylone produced significantly more seedlings than did control plots. All materials gave excellent weed control, adequate control of *Fusarium*, reduced all ectoparasites, and increased marketable yields. **Okra:** Of 5 nematocides tested none showed fungicidal activity, but ectoparasitic and rootknot nematodes were reduced by all treatments. Harvest records showed that EDB- and Fumazone-treated plots produced significantly more fruit than did Dirlone-treated plots, and all were significantly better than control plots.

480. ROSBERG, D. W., AND JOHNSON, H. B.
Post-harvest infrared irradiation for the control of graymold neck rot disease of onions.

From abstr. in *Phytopathology*, 1958, **48**: 345.

Infrared irradiation from lamps 6 in. above freshly-harvested Excel onions for 6 min. reduced post-harvest decay and breakdown in storage caused by *Botrytis allii*. Decay was reduced to a greater extent in storage at 34° F. than in ordinary storage. There were indications that post-harvest infrared irradiation of onions was a possible means of artificially curing bulbs when conditions were unfavourable for field curing.

481. TIMS, E. C.
Treatment of pink-root-infested soil with Vapam and Mylone.

From abstr. in *Phytopathology*, 1958, **48**: 398.

Soil naturally or artificially infected with *Pyrenochaeta terrestris* was treated with Vapam at 1–4 qt. per 100 sq. ft. and with Mylone 85-W at $\frac{3}{4}$ –5 lb. per 100 sq. ft. Onion seedlings were used as test plants to indicate the severity of pink root. Vapam gave almost complete control of the disease in naturally infected soil at all the rates used. Mylone gave good control only at the higher rates. In artificially inoculated soil the chemicals were much less effective. No phytotoxicity occurred if 15–21 days elapsed between applying the chemicals and sowing the onion seed. Nematode populations in the natural field soil were almost completely destroyed by the heavier applications of Mylone and Vapam.

482. JANÝŠKA, A.
Hád'átko zhoubné (*Ditylenchus dipsaci* Kühn 1858) na česneku. (The nematode *Ditylenchus dipsaci* on garlic.) [Russian and German summaries $\frac{3}{4}$ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 395-410, bibl. 20, illus.

Hot water treatment of cloves of garlic before autumn planting gave unsatisfactory control of nematodes, and treatment before spring planting almost prevented sprouting. Fumigation with methyl bromide at 15 g./cu. m. for 8 hrs gave very good control; in the autumn it stimulated sprouting but inhibited it in the spring even at a lower rate, 10 g./cu. m. Surprisingly good results were obtained by steeping the cloves for 24 hrs at laboratory temperature in 1–16% solution of Polybaryt (containing 20% polysulphide sulphur) or lime sulphur (14% polysulphide sulphur). With the exception of 16% Polybaryt no reduction in sprouting occurred. In the autumn infestation was reduced by both materials from 46.5% to 2.51%, and in the spring from 10.5% to 0.58–1.21% by Polybaryt and from 10.5% to 0.3–55% by lime sulphur. Yields were increased by treat-

ments with 1-8% Polybaryt and 1, 4, 8 and 16% lime sulphur.

Root crops.

(See also 47.)

483. DICKSON, M. H., AND PETERSON, C. E.
Hastening greenhouse seed production for carrot breeding.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 412-15, bibl. 1.

Chantenay carrots stored at 32°, 40°, 45° and 50° F. for 2-8 weeks showed no significant differences in the subsequent rate of bolting. Following 4, 7 and 10 weeks at 40° F., Nantes bolted before Chantenay or Imperator, but in all three varieties seedstalk formation was most rapid after 10 weeks of storage. After cold storage (40° F.), carrots grown at a night temperature of 55° F. bolted more rapidly than did those grown at 65° F. Plants moved from 55° F. to 70° F. when seedstalks became visible flowered 15 days earlier than those which remained at 55° F. For the most rapid and uniform seed production in carrots after autumn harvest, the roots should be stored for 10 weeks at about 40° F. and then grown at 55° F. The temperature should subsequently be raised to 70-80° F. to hasten anthesis and seed maturity. [From authors' summary.]-Mich. St. Univ., E. Lansing.

484. LAMM, R., AND HINTZE, S.
Lokala gödlingsförsök med morot och rödbeta 1952-1954. (Local manurial trials with carrot and beetroot 1952-1954.) [English summary $\frac{1}{2}$ p., Esperanto summary $\frac{1}{4}$ p.]
Medd. Trädgårdsförs. Malmö **114**, 1958, pp. 16, bibl. 8.

Three levels of P and 2 levels of K were applied to Chantenay carrots and Flat Egyptian beetroots in widespread trials. In general carrot yields were increased at both levels of superphosphate application. Beetroot response to potash was favourable, even in soils rich in available K. On soils deficient in P there was a positive interaction between P and K.

485. VAN TURNHOUT, H. M. T., AND VAN DER LAAN, P. A.

Control of *Lygus campestris* on carrot seed crops in North Holland. [Dutch summary.]
Tijdschr. PlZiekt., 1958, **64**: 301-6, bibl. 8.

Two sprays of 0.75% DDT or of dieldrin (0.2% Dieldrex 15) applied in the first half of July controlled bugs on a carrot seed crop. Control by DDT was significantly better than that with dieldrin. In germination tests, the percentage from control plots was 53%, from dieldrin plots 65%, and from DDT plots 89%.—Lab. toegep. Ent., Amsterdam.

486. GLASSER, R. F., AND OTHERS.

Occurrence of a toxic non-aldrin residue in carrots grown on aldrin-treated soil.

J. econ. Ent., 1958, **51**: 337-41, bibl. 10.

A study was made to determine the cause of discrepancies between the 3 methods of residue determination used: *Drosophila* bioassay, total chloride and phenyl azide. Residues from direct bioassay of carrots were significantly greater than those from chemical methods, which require preliminary extraction and chromatography. Additional chromatographic analysis showed the presence of a second toxic constituent identified as dieldrin, which, it is suggested, was converted from aldrin either in the carrot plant material and/or in the soil [see also *H.A.*, 27: 1585k].—Dep. Ent., Cornell Univ., Ithaca, N.Y.

487. BÖNING, K.

Untersuchungen über die Schwärze (*Verticilliose*) des Meerrettichs. (Studies on *Verticillium* wilt of horse-radish.) [English summary $\frac{1}{4}$ p.]

Z. PflKrankh., 1958, **65**: 513-29, bibl. 22, illus.

Susceptibility of horse-radish to *Verticillium* infection was related to nutrition, but differences were only apparent under extreme conditions. Infection was increased under conditions of low phosphate levels or of N fertilization alone; resistance could not be improved by increased phosphate and potash levels without the risk of reducing yields. Yields were increased by high applications of farmyard manure, however, with a reduction in *Verticillium* infection. High levels of liming resulted in increased infection. Deficiencies of Mo or B did not affect disease incidence.—Bayer. Landesanst. PflBau u. -Schutz, München.

488. READ, D. C., AND CANNON, F. M.

Control of root maggots in rutabagas in Prince Edward Island.

Canad. J. Plant Sci., 1958, **38**: 307-13, bibl. 7, illus.

In the 1955 tests a pre-planting treatment with heptachlor at 5 lb. per acre in a 5-in. band, $1\frac{1}{2}$ in. below the seed in the planting ridge, gave an average of 93% control of *Hylemyia brassicae* in swedes. Other treatments, tested in 1952-55 were less effective.

489. STANHILL, G.

Effects of soil moisture on the yield and quality of turnips. II. Response at different growth stages.

J. hort. Sci., 1958, **33**: 264-74, bibl. 9.

Plots of turnips at 8 different stages of growth were subjected to a 3-week period of either daily irrigation or no irrigation. The treated plants were shielded from rainfall during this period. Before and after the period of treatment watering was

sufficient to prevent any large soil moisture deficit arising. The different responses in yield brought about by a period of wet treatment applied at different ages could be related to 3 distinct phases of growth of the plants. During the first phase, when the plants were seedlings, a wet period increased the weight of leaves and edible roots at harvest. During the second phase, when root swelling had started, a wet period depressed the yield at harvest; this was attributed to changes in nitrogen utilization within the plant which occurred during this phase. During the third phase, which extended to harvest, a wet treatment produced the greatest increase in final yield; the later the time of wet treatment in this third phase, the greater was the effect. The quality of cooked turnip roots was affected only by those watering treatments which were applied in the 4 weeks preceding harvest. During this stage a wet treatment gave the roots a milder flavour and smoother texture than a dry treatment. Under the near-optimum soil moisture conditions of the wet plots, the yield of turnips was negatively correlated with temperature above 600 day degrees and was positively correlated with net radiation. [From author's summary. For part I see *H.A.*, 28: 2638.]—*Nat. Veg. Res. Stat.*, Wellesbourne.

490. THERON, A. A.

Some effects of soil temperature on the growth and chemical composition of plants.

Diss. Abstr., 1958, **18**: 753-4, being *L.C. Card No. Mic* 58-868 of 197 pp.

Turnip yields tended to increase with soil temperature in summer, while in winter the optimum temperature for growth appeared to be 20° C. Height and dry weight showed the greatest temperature coefficients where no N was given. At low soil temperatures, urea, ammonia and nitrate were equal as N sources. With increases in soil temperature urea- and ammonia-treated plants yielded progressively less. The optimum soil temperature for sodium nitrate-treated plants appeared to be 20° C. It was suggested that nitrate was produced from urea and ammonia by bacterial oxidation to nitrite at higher temperatures, and this ion had a limiting effect on growth. In turnips significant increases in total N content and nitrate content were associated with increases in soil temperature. Nitrate and total N uptake were found to be more dependent on soil temperature at low than at high levels of soil fertility. Increased soil temperature resulted in increases in K and Ca uptake.—*Cornell Univ.*

491. MOURSI, M. A., AND MAKSOUD, M. A.

The influence of fertilizers on root yield and vegetative growth of turnip. [Arabic summary 1 p.]

Ann. agric. Sci. Cairo, 1956, **1**(2): 221-7, bibl. 3, [received 1958].

Turnips were sown at monthly intervals from Sept. to Nov. Applications of calcium nitrate increased the yield of roots more than superphosphate or potassium sulphate, and a significant increase in yield was obtained from P in the case of the latest sowing only. The growth of foliage was greatest on plants receiving N and was unaffected by P and K. A fall in temperature during growth resulted in a decrease in the proportion of leaves to root on each plant.—*Univ. Ain Shams, Cairo.*

J.R.L.

Salad crops.

(See also 25, 53, 558a, t, y, 559b.)

492. IKUMA, H., AND THIMANN, K. V.

The mechanism of germination in light-sensitive lettuce seed.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxiv.

Experiments with Grand Rapids lettuce seeds showed that removal of the endosperm allowed germination in darkness. It was shown that the photosensitive site of the seed is in the hypocotyl. It is suggested that, in the germination process, root elongation is made possible through a weakening of the mechanical restriction of the innermost covering layer by an enzyme secreted from the hypocotyl, and that the effect of light is to activate this secretion. Experiments with injected enzymes have given partial support to this theory.—*Harvard Univ., Cambridge, Mass.*

493. HABER, A. H., AND TOLBERT, N. E.

Metabolism of C¹⁴-bicarbonate, P³²-phosphate, or S³⁵-sulfate by lettuce seed during germination.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxiv.

Chromatographic analyses of extracts from germinating seeds showed that C¹⁴ was fixed into soluble compounds within an hour from the beginning of imbibition. Within 3 hours one third of the total fixed activity appeared in malic acid, and 12-15% in glutamine, aspartic, citric or glutamic acids. The patterns of distribution were similar during all phases of germination, even after radicle protrusion. No difference in either extent or pattern of C¹⁴ fixation was noted between seeds germinating under white and those under far-red light. Neither P³²-phosphate nor S³⁵-sulphate was metabolized by the seeds until after radicle protrusion. After mechanical puncture of embryo coats, P³² and S³⁵ were absorbed within 3 hours, though time of radicle protrusion was unaltered. Patterns of P³² and S³⁵ distribution were similar before and after radicle protrusion.—*Oak Ridge nat. Lab., Tenn.*

494. MAYER, A. M.

Ascorbic acid oxidase in germinating lettuce seeds and its inhibition.*Physiol. Plant.*, 1958, **11**: 75-83, bibl. 18.

It is shown that lettuce seeds and seedlings contain large amounts of a very active ascorbic acid oxidase, which is localized in the cytoplasmic fraction of the cells. The ascorbic acid oxidase activity rises sharply after 24 hours of germination, independently of the germination percentage. The oxidase activity is not affected *in vitro* or *in vivo* by coumarin. Thiourea completely inhibits ascorbic acid oxidase *in vitro* and *in vivo*. IAA somewhat inhibits ascorbic acid oxidase *in vitro*. The possible significance of ascorbic acid oxidase in the germinating seeds is discussed and it is shown that it could mediate the entire oxygen uptake of the seeds. The action of thiourea on germination appears to be that of causing a change in the metabolism of the seeds at a very early stage towards other terminal oxidases and presumably changing other aspects of metabolism also. It is shown that the action of IAA cannot be attributed solely to its effect on ascorbic acid oxidase. [Author's summary.]—The Hebrew Univ., Jerusalem.

495. POLJAKOFF-MAYBER, A., AND EVENARI, M.
Some further investigations on the oxidative systems of germinating lettuce seeds.*Physiol. Plant.*, 1958, **11**: 84-91, bibl. 9.

The oxidative capacity of the particulate fraction of lettuce seeds variety G.R. was investigated. It was shown that the particles have low activity for the tricarboxylic acid cycle intermediate. The activity increases as growth proceeds. The ability to oxidize various intermediates develops gradually with growth, succinic oxidase being the first system to develop. The oxidative capacity towards various substrates is dependent on the tonicity of the isolation medium. It is concluded that the oxidative paths of the seeds change during germination and growth. Thiourea, which stimulates germination, does not markedly change the total gas exchange of the whole seeds. It does, however, cause a complete shift in the oxidative metabolism of the germinating seeds. This is borne out by the fact that the tricarboxylic acid cycle enzymes in thiourea germinated seeds starts operating very early during germination. [Authors' summary. For earlier work see *H.A.*, 28: 534x.]—Hebrew Univ., Jerusalem.

496. SKINNER, C. G., TALBERT, F. D., AND SHIVE, W.
Effect of 6-(substituted) purines and gibberellin on the rate of seed germination.*Plant Physiol.*, 1958, **33**: 190-4, bibl. 6.

Presoaking Early Curled Simpson lettuce seeds in gibberellin solutions at 30 and 100 $\mu\text{g./ml.}$ gave 11 and 15% germination, respectively, while presoaking seed in 1 and 10 $\mu\text{g./ml.}$ of 6-benzylaminopurine resulted in 4 and 23% germination respec-

tively [see also *H.A.*, 27: 3537]. A combination of gibberellin and the purine derivatives yielded a marked synergistic stimulation of germination rate. A mixture of 1 $\mu\text{g./ml.}$ of 6-benzylaminopurine and 30 $\mu\text{g./ml.}$ of gibberellin gave 71% germination. These results suggest that although the purine derivatives and gibberellin differ in their mode of action their functions are probably closely related. [See also *H.A.*, 28: 2718c.]—Univ. Texas, Austin.

497. HABER, A. H.

Rendering light-insensitive lettuce seed sensitive to light.From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxiii.

New York lettuce seed germinated equally well in darkness or under continuous white or far-red light at 21° C. Viability was almost completely destroyed by X-irradiation under far-red light, but was unaltered under white light. After seeds had been frozen in liquid N following various short periods of imbibition, germination under far-red light was much lower than under white light. Similarly, 2,4-dinitrophenol and mannitol were more inhibitory under far-red than under white light.—Oak Ridge Nat. Lab., Tenn.

498. BENSINK, J.

Morphogenetic effects of light intensity and night temperature on the growth of lettuce (*Lactuca sativa* L.) with special reference to the process of heading.Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1958, **61**: 89-100, bibl. 3.

At low light intensity and/or high night temperature long and narrow leaves (high length/breadth ratio) were formed by lettuce plants. Differences in varietal response to light intensity were observed. The first leaves of a young plant were relatively long and narrow under most conditions; the following 12-15 leaves showed a gradually decreasing l/b ratio, until with the formation of broad leaves (l/b = 0.8) heading became possible. The rate and extent of this gradual decrease of l/b ratio was determined by light and temperature conditions. During heading the young leaves, despite conditions of decreasing light intensity produced by the surrounding layer of outer leaves, continue to grow with a low l/b ratio, and it is suggested that there is a growth-controlling influence of the older outer leaves on the inner leaves. This has been demonstrated experimentally by partial defoliation.—Lab. Plant. Physiol. Res., Wageningen.

499. BUKOVAC, M. J., AND WITTWER, S. H.

Reproductive responses of lettuce (*Lactuca sativa*, variety Great Lakes) to gibberellin as influenced by seed vernalization, photoperiod and temperature.*Proc. Amer. Soc. hort. Sci.*, 1958, **71**: 407-11, bibl. 8, illus.

Gibberellin applied to the growing tips of seedlings promoted flowering in lettuce grown in short (8-hour) or long (19-hour) photoperiods, and at low (10–13° C.) or high (18–21° C.) temperatures. Flowering responses (percentage of plants flowering, days from seed to first flower primordia, and seed-stalk height) were more pronounced and consistent with gibberellin treatment than with long-day, high-temperature or seed-vernalization treatments. The possible use of gibberellin in the commercial production of lettuce seed is suggested.—Mich. St. Univ., E. Lansing.

500. FROST, A. A.

Tube-grown lettuce at Pershore.

Agriculture, Lond., 1958, **65**: 296-8.

For the last 2 seasons May Princess and Cobham Green lettuces have been raised by pricking out into paper tubes, 1½ in. diam. × 2 in. deep, placed 40 in a seed box and filled with John Innes compost. The advantages have been that the seedlings (a) can be handled larger than when raised by conventional methods, (b) are not subject to the same degree of check when planted out into poor soil, and (c) are not so subject to *Botrytis* infection when planted in a glasshouse. The costs of raising plants by this method is 10d. per dozen.—Pershore Inst. Hort. J.R.L.

501. PARUPS, E. V., AND GOODWIN-WILSON, R.

Nutrition of lettuce with nitrogen, phosphorus and potassium on organic soils in Ontario.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 399-406, bibl. 28.

Lettuce growth responses to various levels of N, P and K on 3 organic soils (considered to be low in P and K) were studied under greenhouse and field conditions. Newly-broken organic soil had a high requirement for P, while older soil responded to N additions. On these soils added K gave no positive yield increases. There were differences in the productivity of the soils depending on the length of cultivation.—Cent. Exp. Fm, Ottawa, and Ontario agric. Coll., Guelph.

502. GROGAN, R. G., AND OTHERS.

The association of *Olpidium* with the big-vein disease of lettuce.

Phytopathology, 1958, **48**: 292-7, bibl. 19.

Fumigation of big-vein infested soil with DD, chloropicrin, CBP 55 or CS₂ prevented the occurrence of big vein symptoms on lettuce, but symptoms still occurred after EDB fumigation. Symptoms did not develop in plants which were grown for 8 weeks in infected soil, lifted, dipped in mercuric chloride and transplanted to sterilized soil. Ground root juice from infected plants was not infectious after being filtered through No. 5 or 7 Mandler filters, which were capable of retaining the zoospores but able to pass a virus. Root examinations of typically diseased plants showed con-

sistent infection with *Olpidium brassicae*. The authors consider that big-vein disease is caused by some substance produced by *Olpidium*, which induces symptoms after being translocated to the leaves. [See also *H.A.*, 28: 3732.]—Univ. Calif., Davis.

503. CANOVA, A.

L'imbianchimento nervale dell'insalata. (Big vein in lettuce.)

Ital. agric., 1958, **95**: 479-82, illus.

This soil-borne virus disease has been completely controlled by partial sterilization of the soil. Promising results have been achieved by treating the plants with NAA or 2,4,6-T to build up resistance before transplanting, but growth was slightly retarded by treatment.

504. WINFREE, J. P., COX, R. S., AND HARRISON, D. S.

Influence of bacterial soft rot, depth to water table, source of nitrogen, and soil fumigation on production of lettuce in the Everglades.

Phytopathology, 1958, **48**: 311-16, bibl. 6, illus.

Some control of bacterial soft rot (caused by *Erwinia* sp. and possibly *Pseudomonas* sp.) on growing lettuce was obtained by application of tribasic copper sulphate plus Agrimycin 100 throughout the season. Rots in transit were controlled by dipping in 10 p.p.m. streptomycin sulphate solution, or by painting the butts with an Agrimycin solution containing 50 p.p.m. streptomycin sulphate. Lettuce plants grown with 24 or 30 in. water tables were deeper green and better flavoured, with lower bacterial rot incidence than plants grown with an 18 in. water table. With low water tables there was less soft rot on ammonium nitrate plots than on plots fertilized with other forms of N. After chloropicrin fumigation there was an initial increase in ammonium-N at the expense of nitrate-N; this was followed (after 40–70 days) by replacement of ammonium-N by nitrate-N. Chloropicrin fumigation did not control soft rots.—Everglades Exp. Stat., Fla.

505. GRANITI, A.

Tentativi di lotta contro il marciume del colletto della lattuga. (Attempts to control collar rot of lettuce.)

Ital. agric., 1958, **95**: 493-501, bibl. 39, illus.

Out-door lettuce plots, in which some young plants were already attacked by *Sclerotinia* and *Botrytis* spp., were treated with Terraclor (containing 75% of PCNB) by applying 500 or 250 c.c. of a 0.5% solution to the soil round each plant. At harvesting, 34–37% of untreated plants were infected by collar rot. Treatment at the higher rate reduced infection to 20%. At the lower rate it was more effective, only 14% of the plants being affected.

506. SIRRY, A. R.
The effect of ultra violet light on *Botrytis* species in culture and on host plants. [Arabic summary $\frac{1}{2}$ p.]
Ann. agric. Sci. Cairo, 1957, 2(1): 201-7, bibl. 3.
 Ultra violet light treatment of lettuce seedlings infected with *B. cinerea* had no effect on the fungus but checked the growth of the lettuce plants, in some cases killing them.—Univ. Ain Shams, Cairo. J.R.L.
507. LOUVET, J., AND DUMAS, M.
 Contribution à l'étude des agents de pourriture de la laitue en culture hâtée ou forcée. (A study of the pathogens producing rot of lettuce under glass.)
Ann. Épiphyt., 1958, 9: 211-41, bibl. 45, illus.
 The principal rot fungi of lettuce under glass in the centre of northern France are *Botrytis cinerea*, *Sclerotinia minor* and *S. sclerotiorum*. *Bremia lactucae* is also important in that it predisposes the plants to infection by *Botrytis*. The control treatments recommended on the basis of experiments are: (1) two disinfections of the top layers of the soil—with steam sterilization in the case of early lettuce—before sowing and before transplanting (against *Botrytis* and damping-off and against *Sclerotinia* respectively); and (2) dusting the young plants with dithiocarbamic acid derivatives (against *Bremia*) and with PCNB (against *Botrytis*).
508. BAKER, L. A. E., AND BILLING, E.
Further observations on the bacterial content of water in watercress beds.
J. appl. Bact., 1958, 21: 4-10, bibl. 7.
 Frequent samplings were made over a year to determine the bacterial content of water in two spring-fed watercress beds in Kent. In one bed the flow of water was slow, and stock sometimes had access to it. In the other bed the flow of water was relatively fast at all seasons, and the surroundings were protected from stock. The results indicate that even in a comparatively well-protected bed the coli-aerogenes content of the water, especially towards the outlet, may be high in summer. This suggests the desirability of making the disinfection of packed watercress with hypochlorite a routine measure.—N.A.A.S., Wye.
- Spinach.*
509. DE ZEEUW, A.
 Enkele cijfers van de teelt van fabriekspinazie. (Some figures on growing spinach for canning.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1958, 21: 419-22, 439.
 In comparing costs of producing canning spinach, it was shown that extensive growing on a large farm was more profitable than intensive culture on a small scale.—Landb Econ. Inst.
510. SCHUPHAN, W., AND POSTEL, W.
 Action de la fumure et du climat sur la teneur en amino-acides indispensables. (Effect of manuring and climate on content of essential amino acids.) [English and German summaries $\frac{1}{2}$ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 45-61, bibl. 12.
 Nitrogen was applied to spinach at 0, 30, 120, 240 and 360 kg./ha. The yield increased progressively up to the 120 kg. application and decreased progressively with higher rates. The content of crude protein increased with each increment of applied N, but that of essential amino acids was highest with 240 kg. of applied N per ha., otherwise the value decreased with increase of crude protein. The same treatments were applied to cabbage growing in soil rich in N, where 30 kg. per ha. produced the highest value for essential amino acids, which decreased progressively as yields increased at higher N levels. Cauliflowers were provided with 0, 120, 180 or 240 kg. of N per ha., 120 kg. giving the highest yield as well as the highest content of essential amino acids. The 2 higher rates reduced both yield and protein quality below those of the control. The quality of proteins in kale deteriorated considerably between October and February, while the content of crude protein increased.—Bundesanst. Qualitätsforsch., Geisenheim.
- Tomatoes and other Solanaceae.*
- (See also 3, 16, 23, 48, 50, 436, 558i, k, q, 559a, c, o, q, r, t, w, y.)
511. TOMES, M. L., AND QUACKENBUSH, F. W.
Caro-Red, a new provitamin A rich tomato.
Econ. Bot., 1958, 12: 256-60, bibl. 11, illus.
 This variety is orange in colour with orange-red flesh. The fruit contains 10 times as much *beta*-carotene as Rutgers, the values being within the lower range reported for carrots.
512. MCCALLUM, D. W.
Production of government approved tomato seed.
N.Z. Comm. Gr., 1958, 14(2): 7-9, 15, illus.
 Small quantities of selected tomato seed are provided by the Horticultural Research Station, Levin, for multiplication under supervision by members of the Horticultural Seedmen's Association in Blenheim. Methods of culture and extraction by hydrochloric acid are described.
513. HOWLETT, F. S.
Effect of temperature upon flower development and fruit set in the greenhouse tomato.
43rd Annu. Proc. Ohio veg. Potato Grs Ass. 1958, pp. 21-31, bibl. 14.
 The author discusses the practical aspects of the effects of night temperature. At Wooster with

WR7 tomato the increase in flower number at 50° F. night temperature was not outstanding, but this may be a varietal effect. It is concluded that a night temperature of 60° F. at the level of the growing plants is preferable for tomatoes grown from January to March in Ohio greenhouses. With improved light conditions the temperature may be slightly raised, but not above 63–65° F. at any time.

514. GILLOW, J. G.

Artificial light does not pay in Guernsey.

Grower, 1958, 50: 912-15.

In 2 seasons on a commercial tomato holding in Guernsey, yields from Potentate sown in late December or early January and given no supplementary light during propagation, were compared with those sown 2–3 weeks earlier and given extra light (12 hours daily) for 19–21 days from pricking out. Differences in early and total yields between lighted and unlighted seedlings were small. Lighted plants produced larger fruit of lower quality which reduced the financial returns, and profit was further reduced by lighting costs.

515. MOORE, J. N., KATTAN, A. A., AND FLEMING, J. W.

Effect of supplemental irrigation, spacing, and fertility on yield and quality of processing tomatoes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 356-68, bibl. 20.

Maximum returns from supplemental irrigation were obtained in conjunction with close spacing when the available soil moisture was maintained above 50%. The reduction in area allowed per plant from 18 sq. ft. to 9 sq. ft. at this level of irrigation resulted in an increase in total yield from 15.31 to 22.54 tons per acre. Close spacing was associated with reduced fruit number per plant and lower average weight per fruit, and this effect was not offset by proportional increases in rates of fertilization. At close spacing frequent irrigation improved average fruit weight. At the end of the harvest season leaf contents of N, P and K were higher in plots irrigated when the available soil moisture dropped to 50% than in plots allowed to dry to the wilting percentage. Both the varieties used in this study were susceptible to radial cracking, which was associated with the higher irrigation level. Colour was improved by close spacing and the higher irrigation level, especially in a period when maximum temperatures ranged from 95° F. to 104° F. The percentage of soluble solids was reduced at the higher irrigation level and during periods of high temperature. Close spacing and a high irrigation level increased fruit pH, but this was sharply reduced under low night temperatures at the end of the season.—Univ. Arkansas, Fayetteville.

516. MARKS, J. D. K.

Metabolism of aging cells.

Diss. Abstr., 1958, 18: 1968, being *L.C. Card No. Mic* 58-2087 of 70 pp.

The capacity for DNP-sensitive phosphate esterification was observed in unripe tomato fruits, and in fruit in the post-climacteric stages of senescence. This capacity was inhibited by bruising the fruit. Green, mature fruit was prevented from ripening normally by injection of dinitrophenol into the fruit or by bruising. Respiration was inhibited by 10^{-4} M cyanide in fruits before the climacteric maximum, but there was no inhibition of the postclimacteric respiration. Cherry fruits respired up to 80% of a labelled substrate (CO_2) within 4 hours. The specific activity of aerobically respired CO_2 was decreased by bruising injury. Bruising increased the specific activity of respired CO_2 , when respiration was measured anaerobically. Particles isolated from senescent avocado fruit that did not possess the capacity for DNP-sensitive phosphate esterification retained the capacity to incorporate radioactive glycine into protein. The relationship of these findings to the metabolism of ageing cells is discussed. [See also *H.A.*, 28: 1023.]—Ohio St. Univ.

517. FRANCIS, F. J.

Some observations on carotenoid biosynthesis in tomatoes.

Proc. Amer. Soc. hort. Sci., 1958, 71: 349-55, bibl. 23.

After injection of maturing Tangerine-type fruits with sodium acetate-1- C^{14} , it was concluded that beta-carotene was not synthesized by the Porter-Lincoln series. All pigments were found to accumulate at the same time, which suggests parallel rather than sequential biosynthesis. Lycopene formation was inhibited by infusions of diphenylamine, mannitol, beta-ionone and alpha-ionone into red fruit, but the other members of the series did not accumulate. Beta-carotene synthesis was either unaffected or increased.—Univ. Mass., Amherst.

518. TEUBNER, F. G., AND WITTEW, S. H.

Structure-activity relationships of the N-aryl-phthalamic acids in flower formation and fruit setting of the tomato.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlvii-xlviii.

Application of certain N-aryl-phthalamic acids to the apical meristem of tomato seedlings during differentiation of the first flower cluster results in increased flower formation due to conversion of the inflorescence from a monochotomous to a polychotomous type. A direct relationship exists between flower forming activity and activity in stimulating parthenocarpic fruit development.—Mich. St. Univ., East Lansing.

519. SHEN, J. Y., TEUBNER, F. G., AND WITTWER, S. H.

Floral morphogenetic changes in the tomato induced by N-m-tolylphthalamic acid.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlviii.

Application of 100–200 p.p.m. of N-m-tolylphthalamic acid to tomato seedlings converts the inflorescence from a monochotomous type to show di- and polychotomous characteristics. The optimum time for treatment to induce multiple branching is when the first or second flower primordia have begun to differentiate, which coincides with the expansion of primary leaves or 9 days after the unfolding of the cotyledons. There are indications that the primary site of action is the developing meristem.—Mich. St. Univ., East Lansing.

520. SPENDER, B.

Die Überwinterung von Gemüsejungpflanzen für das Anbaujahr 1959. (**Overwintering of vegetable seedlings for the 1959 season.**)

Dtsch. Gartenb., 1958, 5: 229–33, bibl. 9, illus.

Yields from overwintered tomato plants sown at the end of August were higher than from plants sown in mid-November and grown without supplementary lighting. The method for overwintering tomatoes is described; Hellfrucht and No. 10 × Bison are 2 varieties which overwintered well. The method of overwintering brassica seedlings is described, and suitable varieties of cauliflower, red and white cabbage, and savoy are given.—Inst. Gartenb., Grossbeeren.

521. MANUNTA, C.

Fisiogenetica della pigmentazione nei pomodori e selezione per ricchezza in vitamina C ed in β -carotene. (**Physiogenetics of pigmentation in tomatoes, and selection for high contents of vitamin C and β -carotene.**) [French, English and German summaries $\frac{1}{2}$ p. each.]

Qual. Plant. Maveg., 1958, 3/4: 291–316, bibl. 40.

Contrary to results from other sources, tomato varieties with fruits rich in β -carotene retained this substance during maturation at temperatures as high as 35°–36° C. The effects of temperature on β -carotene and lycopene are shown for ripening fruits of persimmon and rose hips. The sugar content of San Marzano tomatoes was increased and the lycopene content maintained by crossing with *Lycopersicon pimpinellifolium*. Contents of vitamins A and C in selected interspecific and intervarietal tomato hybrids are given.—Centro Genet. Cons. naz. Rich., Univ. Pavia.

522. WINSOR, G. W., AND MASSEY, D. M.

The composition of tomato fruit. I. The expressed sap of normal and "blotchy" tomatoes.

J. Sci. Food Agric., 1958, 9: 493–8, bibl. 14.

Comparison of normally ripened tomato fruit and fruit showing uneven pigmentation has revealed considerable differences in composition. Thus the normal fruit had a significantly higher content of dry matter, and higher concentrations of total solids, reducing sugars and nitrogenous compounds were found in sap expressed from normal than from blotchy fruit. Sap from normal fruit also had the higher titratable acidity and lower pH. [Authors' abstract—see also *H.A.*, 28: 3752.] In discussing their results the authors point out that, with the exception of phosphorus, there was also a general, though less pronounced, tendency for inorganic constituents to be lower in blotchy than in normal fruit. However, for none of the constituents determined was it possible to establish a critical level. For each of the constituents that occurred in significantly lower concentration in the blotchy fruit there were cases in which the highest value recorded in blotchy fruit exceeded the lowest value found in normal samples in the same year. Moreover, when two years were compared, very little difference in composition was found between the blotchy fruit of one year and the normal fruit of the other.—Glasshouse Crops Res. Inst., Littlehampton.

523. PURCELL, A. E., AND THOMPSON, G. A., JR.
Investigations on the biosynthesis of carotenoids in the tomato.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xlv.

Mevalonic acid was incorporated into the non-saponifiable fraction of ripening tomato fruits 15 times as readily as was acetic acid. There was an accumulation of a 231 m μ absorbing compound at temperatures below those optimal for ripening, which is possibly an intermediate in carotenoid biosynthesis.—Calif. Inst. Tech., Pasadena.

524. BROWN, A. L., JURINAK, J. J., AND MARTIN, P. E.

Relation of soil properties to Br uptake by plants following soil fumigation with ethylene dibromide.

Soil Sci., 1958, 86: 136–9, bibl. 8.

Both tomato and tobacco plants increased in Br content very markedly as a consequence of fumigation. Clay content [of the soil] had a highly significant effect on uptake of Br by plants, there being an increase in Br with increasing clay. Whether the soils were air-dried or maintained at field capacity for the second week after fumigation made little difference in the amount of Br taken up by tomato plants. In some instances more Br was taken up following air-drying than when soils were maintained at field capacity. This latter effect occurred in both check series and EDB-treated series. An analysis of the water-soluble inorganic bromide in the soil indicated that there was sufficient Br in this form in the soil to account

for the total amount extracted by the plants. [From authors' summary.]—Univ. Calif., Davis.

525. ANDERSON, R. E.

Factors affecting the acidic constituents of tomato.

Diss. Abstr., 1958, **18**: 356, being *Publ.* 25,189 of 68 pp.

Ripening fruits of field and greenhouse tomatoes were analysed at various stages for acid content. It was found that variability in pH and titratable acidity of single fruits from the same plant was as great or greater than that of single random fruits from a large number of plants. Differences in fruit size did not appear to affect variability of pH or titratable acidity. Acid contents of tomatoes ripened at 15° C. were significantly higher than of those ripened at 20° C. Malic acid decreased with each increase in temperature but the citrate-aconitate content was higher at 15° and 30° C. than it was at 20° C. The occurrence of seasonal trends in acidity was not very consistent. In determinations of the organic acids it was found that with increasing maturity fruit ripened at 20° C. decreased in each of the acids. It was also observed that the malate content of Stokesdale tomatoes accounted for between 13 and 15% of the total acids determined, with the balance being due to the citrate-aconitate anions. Of the total organic acids found in tomato fruits in this investigation approximately $\frac{1}{3}$ were present as salts. It is suggested that, if this relationship is true for other varieties, measurements of pH and titratable acidity alone should provide a reasonably adequate evaluation of the acidic constituents of a new tomato introduction.—Univ. Illinois.

526. MOURSI, M. A.

Physiological ontogeny in tomatoes and its relation to cultural procedures. I. Growth analysis of tomatoes in relation to nitrogen. [Arabic summary 1 p.]

Ann. agric. Sci. Cairo, 1957, **2** (1): 121-9, bibl. 11.

The following results were obtained from a field experiment in which 9 combinations of 3 rates of N and P fertilizers were applied to Rutgers tomatoes: (1) N applications resulted in an increase in the number of leaves and in the dry weight of the plants. (2) The net assimilation rate and relative growth rates of the various parts of the plants tended to increase in direct proportion to the N applied. (3) The proportion of the metabolites used for production of the leaves increased with the N supply, that for the stems decreased with the N supply, and that for the fruit was unaffected by the N supply. (4) The number of leaves and dry weight of the plants increased during the season, but the net assimilation rate and the growth rates of the various parts of the plants decreased during the same period. (5) The proportion of the photo-

synthetic products consumed by the leaves decreased during the season but the proportion used by the fruits and the stems increased.—Univ. Ain Shams. J.R.L.

527. LINGLE, J. C., AND OTHERS.

Tomato fertilizer trials.

Calif. Agric., 1958, **12** (8): 11-12, illus.

Small amounts of phosphate (25 lb. P_2O_5 /acre) placed 2 in. below the seed of direct-sown tomatoes resulted in significantly higher early yields than did side-dressings of up to 120 lb. each of N, P_2O_5 and K_2O . Total yields were not greatly affected. In further trials close placement of N and K was shown to have little effect on growth. There was no difference between responses to fertilizer applied 2 in. and 4 in. below the seed.

528. ALEKSANDROV, V. G.

Organo-mineral fertilizers and silicate bacteria. [Russian.]

Doklady vsesojuz. Akad. sel'sk. Nauk, 1958, **23** (7): 43-8, bibl. 10.

In experiments with 4 crop plants including tomato, organo-mineral fertilizers increased yields by an average of 12.7% and by inoculating the fertilizers with silicate bacteria an additional 15% increase was obtained.

529. BOWEN, T. J.

Boron and molybdenum requirements of the tomato crop in the granite soils of the Stanthorpe district.

Qd J. agric. Sci., 1957, **14**: 253-9, bibl. 4.

In 2 trials significantly greater yields of tomatoes were obtained from plants treated with borax as a foliage spray or soil dressing, or with ammonium molybdate foliage spray, than from plants treated with urea or cobalt chloride foliage sprays or left untreated. No further significant increase in yield was obtained by using two Mo sprays or by applying Mo and B together. J.R.L.

530. VOINEA, M., AND BUNESCU, D.

Influența tăierilor la tomate asupra coacerii și producției de fructe. (The effect of pruning on the ripening and yield of tomatoes.) [Russian and French summaries $\frac{1}{2}$ p. each.] *Anal. Inst. Cerc. agron.*, 1956 (issued 1957), **24** (5): 369-77, bibl. 4.

No pruning produced the heaviest total crop. Early yield was increased but total yield was reduced in proportion to severity of pruning. By retaining the greatest number of active leaves yield was maintained and earliness and quality improved.

531. MORGAN, C. N.

Parallel wire trellis for tomatoes.

Qd agric. J., 1958, **84**: 443-6, illus.

Stout posts are placed at the ends of rows 5-6 ft. apart, with medium-sized posts at 1 chain intervals in the rows and 4 stakes to each chain of row to

support the plants on the wires. The plants are placed 20–22 in. apart in the row, and when they are 1 ft. high the first pair of parallel wires is taken along the row on either side of the plants. A second set of wires is added later at 2½ ft. and a third at 4 ft. as required. Plants are pruned to the lateral immediately below the first truss so that they develop two main arms. Later pruning consists of removing “water shoots” only. Grosse Lisse, an indeterminate type, is the chief variety grown on this system in south-eastern Queensland. J.R.L.

532. FADEEVA, T. S.

The interrelation of regenerative processes and growth in grafted plants. [Russian, with English summary 8 lines.]

Bot. Zhurnal, 1958, 43: 788-98, bibl. 8, illus.

Grafting was used as an experimental method of inducing abnormal conditions of growth in certain parts of tomato and sunflower plants. Tissue formation in the injured area was found to depend on the balance of sap movement. It was also observed that, while regeneration is local and based on increased activity of the neighbouring meristem, the form it took depended on the general growth of the plant or shoot and on the position of the injury. [From author's English summary.]—Leningrad State Univ.

533. HACK, T., AND WARTENBERG, H.

Untersuchungen des Blattrollens der Tomatenpflanzen. (Studies on leaf-rolling in tomato plants.) [English summary ½ p.] *Phytopath. Z.*, 1958, 33: 385-98, bibl. 11, illus.

Morphological studies of leaf roll were made with tomato plants from which tops and axillary shoots had been removed. It was shown that leaf-roll was not a result of starch accumulation in the leaves. It is suggested that removal of axillary shoots resulted in the accumulation of hormone precursors in the leaves, which is followed by disproportionately high concentration and activity of growth substances in the physiologically younger parts of the leaves.—Inst. allgem. Bot., Friedrich-Schiller-Universität, Jena.

534. HULEA, A.

Putregaiul inelar al tomatelor. (Blossom end rot of tomatoes.) [English, French, Russian and German summaries 1 p. each.] *Grăd. Via. Liv.*, 1958, 7(5): 48-53, illus., +summaries.

The factors responsible for the disorder are discussed. None of the varieties grown in Roumania is completely resistant. It is suggested that trouble can be avoided by proper regulation of watering, correct cultural treatment, timely harvesting of early crop, low N fertilization and, in the greenhouse, maintaining temperature below 26° C. and humidity below 80%.

535. RICH, S.

Fertilizers influence the incidence of tomato internal browning in the field.

Phytopathology, 1958, 48: 448-50, bibl. 9.

Experiments in 1956 showed that inoculation alone with Boyle and Wharton's C-IB-Tob strain of tobacco mosaic virus did not result in severe internal browning (IB) of tomatoes in the field. Experiments in 1957, however, indicated that, when IB already occurs, it is definitely worse where the virus has been inoculated. High K significantly reduced IB in virus-inoculated plots, compared with low K; high P had little effect. IB showed in more than 1 picking from the same plant, but not necessarily in all pickings. This irregular appearance of IB is not in accordance with the shock reaction theory [see *H.A.*, 27: 3584], and it is suggested that IB may result from any cause that restricts the movement of sugars into the developing fruit.

536. CONOVER, R. A.

Control of tomato diseases.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 344-5.

Control of bacterial spot: In plantbed experiments with a fairly low disease incidence, combinations of copper plus streptomycin gave fair control, but not when disease incidence was high. **Control of fungus diseases:** Maneb, zineb and Dyrene gave excellent control of grey leaf spot. A split schedule of 2 mane b applications to 1 zineb application was the best fungicidal treatment for late blight control.

537. NEW SOUTH WALES, DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.

Bacterial canker of tomatoes.

Agric. Gaz. N.S.W., 1958, 69: 354-6.

The symptoms are described and illustrated. Control may be obtained by selecting seed from healthy plants and treating it with 0.6% glacial acetic acid for 24 hours at 70° F. After drying, the seed should be treated with a copper or organic mercury dust. Field sanitation measures are important.

538. HUSAIN, A., AND KELMAN, A.

The role of pectic and cellulolytic enzymes in pathogenesis by *Pseudomonas solanacearum*. *Phytopathology*, 1958, 48: 377-86, bibl. 34, illus.

The detailed studies described indicate that culture filtrates of *P. solanacearum* contain both pectic and cellulolytic enzymes, and that the main role of these enzymes in pathogenesis is to break down the tissues of host plants. The breakdown of pectic and cellulosic constituents of cell walls in tomato stems is described and illustrated.—N.C. St. Coll., Raleigh.

539. RANIERE, L. C., AND CROSSAN, D. F.

Microclimate and tomato anthracnose.

From abstr. in *Phytopathology*, 1958, **48**: 463.

Temperature within the plant foliosphere was not greatly affected by irrigation. Relative humidity readings revealed considerable differences for as long as 5 days after an irrigation, the relative humidity within the foliosphere of irrigated plants frequently exceeding that of non-irrigated plants by 20%. Irrigation also influenced the duration and intensity of dew formation, the dew period being extended for as many as 4–6 hours in irrigated plots over that in non-irrigated plots. A subsequent increase in the severity of tomato anthracnose was recorded in the irrigated tomato plots. Laboratory studies indicate that *Colletotrichum phomoides* spores will germinate in the absence of free moisture at 92% relative humidity, and that a 12-hour exposure to relative humidity below 80% resulted in a decrease in spore viability.

540. COLLINS, R. P., AND SCHEFFER, R. P.

Respiratory responses and systemic effects in *Fusarium*-infected tomato plants.

Phytopathology, 1958, **48**: 349–55, bibl. 21.

Respiration in leaves of tomato plants was stimulated soon after infection with *Fusarium oxysporum* f. *lycopersici*. Respiration in diseased leaves reached a peak 9–14 days after inoculation, and was sometimes double that of healthy controls [see also *H.A.*, 28: 519]. Stems responded similarly. Results were comparable whether calculated on a dry-weight or nitrogen-content basis, even though total nitrogen at later stages was higher in diseased tissue than in healthy controls. Since leaf blades were not invaded directly by the pathogen, these results suggest systemic toxemia. Respiratory toxins are postulated; these should not be confused with wilt-inducing agents. Permeability changes in pathogen-free leaves of infected plants further support the systemic-toxemia hypothesis. Ethylene, fusarinic acid, and probably pectic enzymes were eliminated as the substances stimulating respiration, although these materials may have other roles in *Fusarium* infection. Ethylene hastened disease development when introduced in solution into inoculated susceptible cuttings, and caused cuttings of similarly treated resistant plants to become diseased. [Authors' summary.]—Mich. St. Univ., E. Lansing.

541. ASHOUR, W. A., AND EL-KADI, M. M.

Damping-off disease of tomato seeds and its control. [Arabic summary 1 p.]

Ann. agric. Sci. Cairo, 1956, **1** (2): 111–126, bibl. 14, illus. [received 1958].

In field and laboratory experiments a higher percentage germination of tomato seeds occurred in March (soil temperature 21.5° C.) than in

higher summer or lower winter temperatures. *Fusarium semitectum*, *Rhizoctonia solani* and *Alternaria tenuis* were isolated, the first more commonly from unemerged seeds, the second from diseased seedlings. Pre-emergence damping-off was prevalent at high temperatures but post-emergence damping-off was commoner at moderate temperatures. Retarding the date of the first watering, or increasing the density of sowing increased the percentage germination but also increased the incidence of post-emergence infection. Yellow cuprocide, 1.5%, was slightly effective in preventing damping-off.—Univ. Ain Shams, Cairo. J.R.L.

542. GROSSMANN, F.

Untersuchungen über die innertherapeutische Wirkung organischer Fungizide. II. Chlornitrobenzole. (Studies on the internal chemotherapeutic effect of organic fungicides. II. Chloronitrobenzene.) [English summary ¼ p.]

Z. PflKrankh., 1958, **65**: 594–9, bibl. 5.

Pentachloronitrobenzene at 50 or 500 p.p.m., when applied before infection to the roots of tomatoes grown in sand, showed an internal chemotherapeutic effect against *Fusarium* wilt, but was slightly phytotoxic at these concentrations. 1,3,4-trichloro-2,6-dinitrobenzene was also effective, but caused greater plant injury than PCNB. 1,3,5-trichloro-2,4,6-trinitrobenzene was not effective against *Fusarium*, but was the only material which significantly reduced infection by *Alternaria solani*. All materials reduced leaf infection by *Phytophthora infestans*. 1-Rhodane-2,4-dinitrobenzene was used in some tests but was highly phytotoxic. It is concluded that the chemotherapeutic effects observed are due to the effect of the fungicides on the host metabolism rather than on the parasite. [For part I see *H.A.*, 28: 2702.]—Univ. Göttingen.

543. EDGINGTON, L. V., AND WALKER, J. C.

Influence of calcium and boron nutrition on development of *Fusarium* wilt of tomato.

Phytopathology, 1958, **48**: 324–6, bibl. 7.

Bonny Best tomato plants inoculated with *Fusarium oxysporum* f. *lycopersici* showed a progressive decline in severity of wilt symptoms with increase of Ca from 5 to 500 p.p.m. Boron levels in a range of 0.001 to 10 p.p.m. affected the trend, but not progressively: with Ca at 5 p.p.m., the disease was very severe at both 0.001 and 10 p.p.m. B; with Ca at 100 p.p.m., the disease index decreased significantly from 0.001 to 0.25 p.p.m. B; with Ca at 500 p.p.m., the index increased consistently, and usually significantly, with increase in B from 0.001 to 0.25 and to 10 p.p.m. [Authors' summary.]—Univ. Wisconsin, Madison.

544. WATKINS, G. M., MOHR, H. C., AND YOUNG, P. A.

Control of southern blight in tomatoes in northeast Texas.

From abstr. in *Phytopathology*, 1958, 48: 346.

In control plots the incidence of *Sclerotium rolfsii* was 52%, while in plots treated with soil applications of PCNB dust at 20 lb. per acre, or calcium nitrate at 150 lb. per acre, disease incidence was 32%. Application of a mixture of 2 lb. Terrachlor 75W and 2 lb. captan 50W per 100 gal. water at transplanting reduced southern blight from 71% to 37.7%.

545. SOWELL, G., Jr.

Control of tomato diseases on the west coast of Florida.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 311-12.

Autumn tests: Dyrene at 1 lb. active material per 100 gal. was superior to carbamates for control of gray leafspot (*Stemphylium solani*). The inclusion of calcium chloride (for blossom-end rot control) in insecticide and fungicide applications did not affect insect and disease control, or yield. Bacterial spot (*Xanthomonas vesicatoria*) on tomato seedlings was most successfully controlled by basic copper sulphate (2 lb. metallic Cu per 100 gal.) plus streptomycin at 100 p.p.m. *Spring tests:* Late blight was slightly more severe in Dyrene plots than in plots sprayed with carbamates, which gave excellent control of late blight. A mixture of basic copper sulphate (2 lb. metallic Cu), Dyrene (2 lb.) and streptomycin at 100 p.p.m. gave control of bacterial spot equal to that obtained with copper and streptomycin alone, and this combination may be of value when both gray leafspot and bacterial spot are present.

546. SIVADJIAN, J., AND KERN, H.

Über den Einfluss von Welketoxinen auf die Transpiration von Tomatenblättern. (On the effect of wilting toxins on the transpiration of tomato leaves.) [English summary 9 lines.] *Phytopath. Z.*, 1958, 33: 241-7, bibl. 10, illus.

With the aid of specially treated, water sensitive photographic plates it is possible to study the transpiration of leaves or different parts of a single leaf. In the present paper the effects of various wilt toxins on the transpiration rate of tomato leaves are compared. In the course of an intoxication with these toxins, certain parts of the leaf become necrotic; these necrotic spots represent the leaf areas with the highest intensity of transpiration. It is thus confirmed that an excessive water loss is an important feature of intoxicated and heavily damaged cells. Considerable differences between various toxins may be observed. [Authors' summary.]—Inst. spez. Bot., Eidg. tech. Hochschule, Zürich.

547. GOOD, J. M., AND STEELE, A. E.

Soil fumigation for controlling root-knot nematodes on tomatoes for transplant and for fresh fruit production.

Plant Dis. Reptr, 1958, 42: 1173-7, bibl. 7, illus.

Broadcast applications of DD mixture at 15 and 20 gal. per acre, 83% EDB at 4.4 and 5.9 gal. per acre, and DBCP [dibromo-chloropropane] (30% by weight) on clay granules at 346 and 692 lb. per acre, on land moderately to heavily infested with root-knot nematodes (*Meloidogyne incognita*) did not give the required degree of root-knot control for certification of tomato plants grown for transplanting as root-knot free. However, chemical treatments gave economic control of root-knot nematodes and significant yield increases of tomato fruit. The higher rates of DD mixture and 83% EDB gave better root-knot control and larger yields than lower rates. The lower rate of granular DBCP was as effective as the higher rates of DD mixture and 83% EDB. Only at the higher rate of DBCP was there an indication of phytotoxicity. [Authors' summary.]—U.S. Dep. Agric., Tifton, Ga.

548. SHOWALTER, R. K., AND TOWNSEND, R. O.
Maturity as related to quality of tomatoes for the fresh market.

A.R. Fla agric. Exp. Stats, 1956-57, p. 98.

In X-ray pictures of tomatoes, varying from very immature to fully ripe, the formation of the jelly-like substance in the locules with increasing maturity was indicated by increasing density. Puffy locules were most easily penetrated by X-rays and produced dense, sharply-defined areas. The possibility of using X-rays in grading tomatoes is suggested.

549. ANGELI, L.

Heterózispaprika termesztési kísérletek. (Production trials with hybrid pepper.) [Russian and German summaries $\frac{1}{2}$ p. each.] *Kert. Kut. Int. Évk.* 1957, 2: 131-40, bibl. 5, illus.

Hybrid sweet peppers proved well suited for early cropping both under glass and outdoors, being earlier, more productive, more resistant to diseases, and better adapted to consumer requirements than the parent varieties. Lines of research to reduce the disadvantage of high cost of seed production are outlined.

550. OZAKI, H. Y., AND RAY, H. E.

Fertilizer studies of vegetable crops grown on the sandy soils of the lower east coast.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 291-2.

Early yields of marketable peppers were increased by raising the rate of fortnightly N application from 20 to 30-40 lb. N per acre. Highest early

yields were obtained by giving fortnightly applications of 30 lb. each of N and K₂O per acre. Rates of N application did not significantly influence total yields of marketable fruits. Significant increases in total yields were obtained by increasing the seasonal rate of K₂O application from 200 to 300 lb. per acre, when numbers of sunburned fruits were also reduced. Increases in rates of N application resulted in an increase in blossom-end rot, but a reduction in sunburn. The highest yields of quality peppers were produced at the 300 lb. rate of K₂O application, but yields of fancy peppers were reduced when potash was increased to 400 lb. per acre. Pepper yields were not significantly different between 200, 300 and 400 lb. N per acre. Early yields of fancy peppers were highest in NK plots receiving 1 ton of hydrated lime. No differences in fancy pepper yields were obtained between inorganic and organic (castor pomace and tankage) sources of N.

551. FERNANDO, H. E., AND PEIRIS, J. W. L.
Investigations on the chilli leaf curl complex and its control.
Trop. Agriculturist, 1957, **113**: 305-23, bibl. 23, illus.

In addition to the six chilli maladies reported earlier [*H.A.*, 24: 2837] two more have been recognized as the "little leaf" disease and a mosaic, the causal basis of which in either case is not yet understood. Virus-vector relationships have been established for vein-clearing virus disease and the leaf mottle virus disease and the vectors recognized as *Aphis gossypii* and *Bemisia inconspicua* respectively. The vein-clearing virus has been transmitted to tomato and tobacco, and on the basis of its symptom expression in the latter plant, has been classified as the transparent kroepoek strain of the tobacco leaf curl virus. The factors responsible for the high incidence of chilli pests and diseases in the Jaffna peninsula are the cultivation of *Solanaceae* with little effort at rotation, the non-destruction of crop residues soon after harvest and the neglect to clean weed before and during chilli cultivations. Tests with a wide range of modern organic systemic and contact insecticides even at very high dosages have only controlled thrips and mite-induced leaf-curls but not virus-caused leaf curls of chilli. These findings are in line with those obtained in India and U.S.A. Breeding for virus-resistant varieties of chilli appears at present to be the most fruitful line of attack on this problem. [Authors' summary.]—Ceylon Dep. Agric.

552. WINSTEAD, N. N., WELLS, J. C., AND REID, W. W.
Botrytis in pepper seedbeds and on young plants in the field.
Plant Dis. Repr., 1958, **42**: 981-2, illus.

Occurrence of *Botrytis* blight of *Capsicum frutescens* was reported in North Carolina. In preliminary

tests control was obtained with drenches of 1 lb. captan + 1½ lb. pentachloronitrobenzene (active materials) in 100 gal. water, at a rate of ½ gal. per sq. yd.

553. MELIKOVA, S. A.
Black spot of pepper fruits in the Krasnodar region. [Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1958, **23** (7): 39-42, bibl. 6.

The pathogen isolated from diseased peppers is probably identical with *Pseudomonas syringae* var. *capsici* (Orsini) Klement. For control, crop rotation, destruction of plant debris, seed treatment with a bactericide and development of resistant varieties are recommended.

554. SMITH, R. W., AND CROSSAN, D. F.
The taxonomy, etiology, and control of *Colletotrichum piperatum* (E. & E.) E. & H. and *Colletotrichum capsici* (Syd.) B. & B.
Plant Dis. Repr., 1958, **42**: 1099-1103, bibl. 6, illus.

The symptoms produced on the fruit by anthracnose (*C. piperatum*) and ripe rot (*C. capsici*) are very similar. Only one sweet pepper variety, Italian El, has shown moderate resistance to both fungi, but several hot peppers appear to be resistant. Under conditions of high disease incidence zineb and maneb applied at 2-week intervals, starting about 4 weeks after flowering, reduced the amount of fruit rot significantly. Captan and tribasic copper sulphate were less effective.—Del. agric. Exp. Stat., Newark.

555. TOUZEAU, J.
 Observations et essais du lutte contre le blanc du piment (*Oidiopsis taurica*) en 1957 en Tunisie. (Observations and experiments on the control of powdery mildew of capsicum *Oidiopsis taurica*) in 1957 in Tunisia.)
Fruits et Prim., 1958, **28**: 75-85.

Experimental work reported in *H.A.*, 27: 3593 was continued having special regard to the development of the disease in relation to plant growth and climate, the timing and pattern of control treatment and its economics. Wetttable sulphur, 350 g./hl., did not give perfect control but applications at 10-day intervals were more effective and profitable than less frequent ones.

Sundry crops.

556. IMAZU, T., AND ŌSAWA, T.
Studies on udo, *Aralia cordata* Thunb. (1) On breaking dormancy of udo buds. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 108-10, bibl. 2.
 Under natural conditions in Osaka, bud dormancy of the Yozaemon variety of udo ceased towards the end of January, but cold treatment (about 4° C.) for 4 weeks broke dormancy. Gibberellin applied

at 1% in lanoline paste to buds on 10 November, was also effective in breaking dormancy but soaking udo roots for 30 min. in ethylene chlorhydrin solution (0.1, 0.5 and 1%) was not so effective.

557. EDMOND, J. B., AND DRAPALA, W. J.
The effects of temperature, sand and soil, and acetone on germination of okra seed.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 428-34, bibl. 2.

The time of okra seedling emergence was greatly shortened by high temperatures (75°-85° F.), but the total percentage germination was not affected. Sand and soil were equally effective as germinating media. Soaking the seeds in acetone before sowing had no significant effect on rate of seedling emergence or on percentage germination.—Miss. St. Coll., State College.

Noted

558. a ANON.
Three new lettuce varieties released.
Amer. Veg. Gr, 1958, **6** (9): 20.
 Golden State A and B for California and Lakeland for Wisconsin.
- b ANON.
Commercial possibilities of pickling onions and gherkins.
Comm. Gr, 1958, No. 3569, p. 382.
First results of pickling onion trials.
Grower, 1958, **50**: 413.
 Promising results with commercial trial crops in Lincolnshire.
- c BANGA, O. [Editor].
 11^e beschrijvende rassenlijst voor groentegewassen 1959. (**Eleventh descriptive variety list of vegetable crops 1959.**)
 [Publ.] *Inst. Vered. Tuinbouwgew. Wageningen*, 1958, pp. 150, illus., fl. 2.
- d BARHAM, W. S., AND WINSTEAD, N. N.
New cucumbers stop scab and mildew.
Res. and Fmg N.C., 1958, **17** (1): 6, illus.
 High yielding and disease resistant varieties Fletcher and Ashe described.
- e BLECHSCHMIDT, W., AND LANCKOW, J.
 Einsatz der Zusatzbelichtung und Staube-wässerung bei der Anzucht von Treibgemüsepflanzen. (**The use of additional lighting and sub-irrigation in raising vegetable plants for forcing.**)
Dtsch. Gartenb., 1958, **5**: 233-5, bibl. 5, illus.
 Particularly tomatoes and cucumbers.
- f BORN, M.
 Die Möglichkeit einer gezielten Bekämpfung der Kohldrehherzmücke. (**The possibility of large-scale control of swede midge.**)
Dtsch. Gartenb., 1958, **5**: 180-3, bibl. 18, illus.
 By a warning service.

- g BRETT, C. H.
Sevin best control yet for bean beetle.
Res. and Fmg N.C., 1958, **17** (1): 11.
 1 or 2% dust at 25-30 lb./a. was effective against Mexican bean beetle.
- h BUIHAND, T.
 Teelt en veredeling van spruitkool. (**Cultivation and propagation of brussels sprouts.**) [English summary 1 p.]
Meded. Proefst. Groent. Volle Grond, Alkmaar **10**, 1958, pp. 55, bibl. 16, illus.
 Up-to-date information on soils, nutrition, sowing, planting, varieties, picking, pests, diseases and vegetative propagation.
- i CARAÑGAL, A. R., Jr.
Effects of nitrogen, phosphorus, and potassium on the organic acids of the tomato, *Lycopersicum esculentum*, Mill.
Diss. Abstr., 1958, **18**: 1597-8, bibl. 7, being *L.C. Card No. Mic 58-758* of 134 pp.
 See *H.A.*, 25: 661.
- j CARDONA A., C., BARROS N., O., AND SKILES, R. L.
 Diacol Nutibara, una nueva variedad de fríjol. (**Diacol Nutibara, a new bean variety.**)
D.I.A. Bol. Divulg. No. 4, 1958, pp. 13, illus.
 A dwarf type from Algarrobo × México 11, suitable for altitudes of 1,400-1,500 m.
- k EFEJKIN, A. K.
The development of flower and inflorescence from the apical meristem in *Solanum lycopersicum*. [Russian.]
Bot. Zhurnal, 1958, **43**: 1179-83, bibl. 25, illus.
- l EVANS, E. P.
Promising new watermelon varieties.
Fmg S. Afr., 1958, **34** (6): 20-1, illus.
 Blackstone and Charleston Grey.
- m FINCH, C. G.
Choice of variety in vegetables.
Rep. 4th [N.I.A.B.] Crop Conf. 1956, Cambridge, in *J. nat. Inst. agric. Bot.*, 1957, **8**: 212-18.
 Recommendations on brassica varieties.
- n FRANKLIN, D. F.
Effects on hybrid onion seed production of using different ratios of male-sterile and pollen rows.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 435-9, bibl. 5.
 Further studies needed before change in ratio can be recommended.
- o FRAZIER, W. A., BAGGETT, J. R., AND SISTRUNK, W. A.
Transfer of certain Blue Lake pole bean pod characters to bush beans.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 416-21, bibl. 10.
 A preliminary attempt to improve characters desired for mechanical harvesting.

- p GILBERT, J. C.
Manoa Sugar: new mildew resistant edible podded pea.
Hawaii Fm Sci., 1958, 7 (1): 1-2, illus.
- q HALSEY, L. H., AND JAMISON, F. S.
Color development characteristics of several tomato varieties.
Proc. Amer. Soc. hort. Sci., 1958, 71: 344-8, bibl. 11.
Rutgers, Homestead and Manalucie compared over 3 seasons.
- r HANNA, G. C.
Four new asparagus varieties.
Calif. Agric., 1958, 12 (10): 13, illus.
Varieties 309, 500W, 711 and 873 are higher-yielding and possibly longer-lived.
- s HWANG, S. L.
A comparison of certain asparagus varieties and strains for spear weight, yield and quality.
Proc. Amer. Soc. hort. Sci., 1958, 71: 425-7.
For fresh and frozen spears.
- t ISENBERG, F. M.
Revolution in handling eastern lettuce.
Amer. Veg. Gr., 1958, 6 (9): 12, 19, 22, illus.
Vacuum cooling in fibreboard cartons.
- u KELSEY, J. M.
Control of *Pieris rapae* by granulosus viruses.
N.Z. J. agric. Res., 1958, 1: 778-82, bibl. 2, illus.
Laboratory tests and observations on natural field infection of caterpillars.
- v KENNELLY, A. G.
The growing of mushrooms.
N.Z. J. Agric., 1958, 97: 145-52, illus.
Practical advice on small scale and home production including the preparation of animal manure and synthetic composts.
- w KINDT, V.
Über die Arbeit der Versuchsabteilung des VEG-Champignonzucht Dieskau. (On the work of the experimental department of the nationalized mushroom growing concern at Dieskau.)
Dtsch. Gartenb., 1958, 5: 201-3, bibl. 7.
Founded at Dieskau near Halle on 1.1.1957.
- x LAMM, R., HINTZE, S., AND ÄVALL, H.
Klassificerande sort- och stamförsök med köksväxter 1955-1957. (Classification trials of vegetable varieties and strains, 1955-1957.) [English summary 4 pp., Esperanto summary 2 pp.]
Medd. Trädgårdförs. Malmö 110, 1958, pp. 39.
- y LANE, J. R.
Determination of tetrachloro-1,4-benzoquinone (Spergon) residues on food crops.
J. agric. Food Chem., 1958, 6: 667-9, bibl. 9.
On broccoli, cauliflower and lettuce.
- z LAVOLLAY, J., AND OTHERS.
Activité comparée des flavonoïdes comme catalyseurs de l'oxydation de l'acide ascorbique par une polyphénol-oxydase. (Comparative activity of flavonoids as catalysts in the oxidation of ascorbic acid by a phenol-oxidase.) [English and German summaries $\frac{1}{2}$ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 508-20, bibl. 9.
In mushrooms.
559.
a LEE, A. E.
The effects of various treatments in different genetic lines of excised tomato roots grown in culture.
Bull. Torrey bot. Club, 1958, 85: 335-40, bibl. 8.
Effects of initial segment length, sucrose concentration and IAA.
- b LEKVE, O.
Pflanzenunschädliche Heizrohr- und Gewächshausfarben. (Radiator and glasshouse paints non-injurious to plants.)
Dtsch. Gartenb., 1958, 5: 207-9, bibl. 1, illus.
Tested on lettuce and kohlrabi seedlings.
- c LESLEY, M. M., AND LESLEY, J. W.
Male-sterile mutants in the tomato from seed treated with the radioactive isotope P³².
Proc. Amer. Soc. hort. Sci., 1958, 71: 339-43, bibl. 14.
- d MILLER, E. V.
Effect of gibberellin on the physiology of certain plants.
From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xxxix.
Tomato and celery sap had a higher absorption spectrum after gibberellin treatment of seedlings.
- e MINISTERIO DE AGRICULTURA DE COLOMBIA, OFICINA DE INVESTIGACIONES ESPECIALES.
Investigación agrícola en Tibaitatá. Agricultural research at Tibaitatá.
D.I.A. Bol. misc. Bogotá, 1, 1958, pp. 70, illus.
A recently established station near Bogota. Work in progress on selection of beans is among that discussed.

- f MURPHY, E. F.
Palatability and vitamin C content of Maine-grown broccoli.
Bull. Me agric. Exp. Stat. **573**, 1958, pp. 15, bibl. 20.
Significantly different vitamin C values were associated with harvest date, from 124 mg. on 28 August to 163 mg. per 100 g. on 11 September.
- g NAKAYAMA, R., AND FUKUJŪ, H.
Studies on the chlorophyll-deficiency found in the segregating generations of varietal hybrids of kidney beans (*Phaseolus vulgaris*). [Japanese, with English summary 1 p.]
Bull. Fac. Agric. Hirosaki Univ., 1957, No. 3, pp. 30-4, bibl. 9.
Chromatographic estimations of chlorophyll and carotenoid pigments in leaves.
- h NEW SOUTH WALES, DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Soil acidity and the growth of vegetables.
Agric. Gaz. N.S.W., 1958, **69**: 356-7.
Vegetables are listed with their optimum pH range.
- i PHILP, J.
Research on vegetables.
Rep. 4th [N.I.A.B.] Crop Conf. 1956, Cambridge, in *J. nat. Inst. agric. Bot.*, 1957, **8**: 204-12.
A review, covering cultivation and nutrition, irrigation, pest, disease and weed control, and variety improvement.
- j PRIDHAM, J. B.
Metabolism of phenolic compounds by the broad bean *Vicia faba*.
Nature, 1958, **182**: 795-6, bibl. 7.
Plants fed with several phenols plus glucose; study continuing.
- k PUERTA, J., AND ALONSO, A.
Pruebas de resistencia a diferentes enfermedades en diversas variedades de judías. (Tests on the resistance to various diseases of several varieties of french bean.) [English summary $\frac{1}{2}$ p.]
Bol. Inst. nac. Invest. agron. Madrid, 1958, **18**: 37-48, illus.
The resistance of 36 Spanish varieties to 6 diseases.
- l SCHAFFER, H. G.
Normal yield of mushrooms produced from pure sand.
Grower, 1958, **50**: 707, illus.
Reporting a review by L. Kneebone on mushroom research at Pennsylvania University.
- m SENGUPTA, A., AND CHAKRABARTY, M. M.
The seed fat composition of *Citrullus colocynthis*.
Sci. and Cult., 1957, **22**: 581-2, bibl. 2.
- n SHERWOOD, R. T.
***Aphanomyces* root rot of garden pea.**
Diss. Abstr., 1958, **18**: 751-2, being *L.C. Card No. Mic* 58-825 of 127 pp.
Fungus growth inhibited by 1 p.p.m. actidione, 0.1 p.p.m. oligomycin, and 10 p.p.m. filipin.
- o SMITH, R. W.
Taxonomy, etiology, and control of several anthracnose fungi attacking pepper.
From abstr. in *Phytopathology*, 1958, **48**: 464.
Zineb and maneb gave satisfactory control of *Colletotrichum piperatum* and *C. capsici* on capsicums.
- p SOROKIN, H. P.
Studies on living cells of pea seedlings. II. Intercellular tubular matter.
Amer. J. Bot., 1958, **45**: 504-13, bibl. 18, illus.
Physical and chemical characteristics of solid substance found in intercellular spaces in stem apices. [Part I noted *H.A.*, 27: 2088 l.]
- q STRYDOM, E.
Hollowness in tomatoes has become a serious problem.
Fmg S. Afr., 1958, **34** (7): 28-9, illus.
Several contributory causes are summarized.
- r SUZUKI, Y.
Polyphenolase and peroxidase in the tomato root tissue and the oxidation of ornithine.
Physiol. Plant., 1958, **11**: 92-8, bibl. 14.
- s SWANSON, J.
Typical cost of producing asparagus in the lower Yakima Valley.
Stats Circ. Wash. agric. Exp. Stats **326**, 1958, pp. 7.
Detailed tables analysing costs of production, machine and labour requirements, yields, etc.
- t TAKAHASHI, T., AND NAKAYAMA, M.
Studies on the coloration of tomato fruits. (I) Measurement of pigment contents of tomato fruits. [Japanese, with English summary $\frac{1}{4}$ p.]
J. hort. Ass. Japan, 1958, **27**: 116-19, bibl. 4.
Methods of measurement and contents of 2 varieties.
- u TURNER, D. H., AND TURNER, J. F.
Uridine diphosphoglucose pyrophosphorylase of pea seeds.
Biochem. J., 1958, **69**: 448-52, bibl. 23.
Of possible major significance in the transformation of sugar to starch in plants.
- v WALKER, M.
Palatability tests of edible podded peas.
Hawaii Fm Sci., 1958, **7** (1): 7.
High ratings for the new powdery mildew resistant varieties HES 110-1-14 (Manoa Sugar strain B) and HES 110-J-A (Manoa Sugar strain A).

- W WELLS, J. C., AND WINSTEAD, N. N.
Pepper diseases and their control.
Circ. N.C. agric. Ext. Serv. **418**, 1958, pp. 12, illus.
 Descriptions and control measures of diseases of sweet peppers.
- X WILSON, D. E.
The adaption of spectrophotometric methods for determining the effect of variety, process and storage on the total carotene, lycopene and beta-carotene content of tomato juice and pulp.
Diss. Abstr., 1958, **18**: 754-5, bibl. 2, being *Publ.* 24,519 of 198 pp.
 The effect of processing methods and periods of storage on pigment content.
- Y YOUNG, P. A.
Deleterious changes in tomatoes resulting from irradiation of seeds.
 From abstr. in *Phytopathology*, 1958, **48**: 346.
 With gamma rays or thermal neutrons.
- Z ZELINSCHI, N.
 Soiuri valoroase de legume pentru regiunile secetoase—Bărăgan și Dobrogea. (**Suitable vegetable varieties for the arid regions of Roumania—Baragan and Dobruja.**) [English, French, Russian and German summaries 1½ pp. each.]
Grăd. Via Liv., 1958, **7** (3): 1-5+summaries.
 Results of variety trials with tomato, bean, cabbage, cauliflower, cucumber and pepper.

TOBACCO.

Breeding and varieties.

(See also 625a, j.)

560. IZQUIERDO TAMAYO, A.
 Estudios sobre tetraploides en el género *Nicotiana*. III. Influencias estacionales en la duración del período vegetativo y desarrollo de tetraploides y diploides de *Nicotiana rustica* y *Nicotiana tabacum*. (**Studies on tetraploids in the genus *Nicotiana*. III. Seasonal influences on the length of the vegetative period and the development of tetraploids and diploids of *N. rustica* and *N. tabacum*.**) [English summary ½ p.]
Bol. Inst. nac. Invest. agron. Madrid, 1958, **18**: 49-83, bibl. 8.

Tetraploids of both species had a longer vegetative period than the diploids. High summer temperatures induced premature flowering in tetraploid *N. rustica*, but tetraploids of *N. tabacum* either withstood high temperatures better than the diploids or required more heat units for their full development. [For note on part II see *H.A.*, 18: 2056b.]—*Inst. Biol. Tabac.*, Seville.

561. MANN, T. J., AND WEYBREW, J. A.
Manifestations of hybrid vigour in crosses between flue-cured varieties of *N. tabacum* and *N. sylvestris*.
Tobacco, N.Y., 1958, **147** (13): 20-5, bibl. 20, illus.

To provide information concerning the manner in which heterosis is expressed in the genus *Nicotiana*, 10 varieties of tobacco were compared with their respective hybrids with *N. sylvestris* for various agronomic and chemical characters. Earliness and a faster rate of growth were the principal manifestations of hybrid vigour in these interspecific hybrids. Differences in yield of hybrids and varieties were not consistent from location to location and were markedly affected by climatic conditions. Assum-

ing that the results obtained with hybrids between flue-cured tobacco varieties and *N. sylvestris* are representative of what might be encountered to a lesser degree in intervarietal tobacco hybrids, it was concluded that early flowering and its consequential effects on number of leaves and suckers might offset any advantages of a faster growth rate. *N. tabacum* × *N. sylvestris* hybrids deviated significantly from the levels of sugars and alkaloids generally associated with desirable quality tobacco. [Authors' summary.]—*N.C. St. Coll.*, Raleigh.

562. KLARNER, S.
 Porównanie dwóch linii krzyżówki Virginii Joyner × Hercegowina Puławska 3800 z odmianami rodzicielskimi. (**A comparison of two lines of Virginia Joyner × Hercegowina Puławska 3800 with the parent varieties.**) [English and Russian summaries 1½ and 1 pp.]
Roczn. Nauk rol., Ser. A, 1958, **77**: 439-77, bibl. 14.

The growth and composition of the 2 lines, Złotolistny IHAR and line 7-5/42 were compared with their parents and some other varieties. Virginia Joyner produced higher, and Hercegowina Puławska 3800 lower, yields of high quality leaf than either of the hybrids. Virginia Joyner leaves had the highest carbohydrate content and Złotolistny IHAR leaf the highest contents of protein, non-protein N and chloride. Złotolistny IHAR and Hercegowina Puławska 3800 were the most, and Virginia Joyner the least, resistant to black root rot (*Thielaviopsis basicola*).

563. LUKPANOV, Ž.
Biochemical characteristics of hybrid forms of tobacco. [Russian.]
Tabak, 1958, **19** (2): 17-18, bibl. 1.

At Alma-Ata a productive hybrid was obtained from Trapezond KV × Trapezond 161, which

differed in vigour and chemical composition from both its parents. It was taller with more and larger leaves, which showed a higher daily increment of dry matter. The leaves of the hybrid had the advantage of a higher carbohydrate: protein ratio but the disadvantage of a higher cellulose content both before and after sun-drying.

Seeds and seedbeds.

(See also 625f.)

564. PAL, N. L., AND GOPALACHARI, N. C.

Studies on the germination of tobacco seed. I. Germination of some commercial varieties of tobacco. II. Effect of temperature on the germination of cigarette tobacco.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 50-2, from CORESTA Inf. Bull., 1958, No. 1, Abstr. 1073.

At Rajahmundry seedbed temperatures may reach 38°-41° C., which is much above the optimum range of 24°-31° C. for tobacco seed germination. The adverse effect is particularly pronounced with freshly imported seeds. Seeds of the varieties Harrison Special and Chatham showed under 10% germination at 38° C. and 35% at 35° C.; the optimum for these varieties seems to be 21°-23° C. Better germination at high temperatures was obtained when the seeds were first moistened and then held for a period at low temperatures before being sown. [See also *H.A.*, 28: 3808.]

565. POWELL, R. D.

Effect of light and temperature on germination of tobacco seed.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xxiii.

Seeds of Golden Harvest tobacco did not germinate when the temperature during the imbibition period was 30° C., but at 20° C. germination reached 82%. The effectiveness of red light applied after imbibition proved to be a logarithmic function of the length of time of exposure. Seeds required aerobic conditions during imbibition at 20° or 30° C. in order to respond to red light.—Univ. Fla, Gainesville.

566. CLARK, F., AND DEAN, C. E.

Supplementary heat and light for the production of tobacco seedlings.

A.R. Fla agric. Exp. Stats, 1956-57, p. 53.

The effects of 4 heat-light treatments were, in general, small, but seedlings grown with heat plus light produced higher yields, and those with heat alone produced the highest percentage of quality tobacco. Yields decreased progressively with delay in sowing from mid-December to mid-February, but sowing in mid-February produced the highest percentage of quality tobacco.

567. JAKOVUK, A. S., AND KOMEL', A. S.

The effect of the age of tobacco seed on the yield of suitable transplants from winter sowing. [Russian.]

Tabak, 1958, 19(3): 55-7, bibl. 3.

Tables are given showing the percentage of germination and the actual and percentage output of transplantable seedlings obtained from winter sowings in the laboratory and in frames of seed of 2 tobacco varieties that was up to 12 years old. It is concluded that to ensure a good crop of seedlings under commercial conditions seed older than 6 years should not be used, but if older seed has to be used the seed rate should be increased.

568. PATRICK, Z. A., AND KOCH, L. W.

Inhibition of respiration, germination, and growth by substances arising during the decomposition of certain plant residues in the soil.

Canad. J. Bot., 1958, 36: 621-47, bibl. 30, illus.

Substances capable of markedly inhibiting the respiration, germination, and growth of tobacco seedlings were obtained after residues from timothy, corn, rye, or tobacco plants had been allowed to decompose under appropriate conditions in the soil. Bio-assay tests, based on manometric methods, made it possible to determine some of the conditions under which the decomposition gave rise to phytotoxic by-products and to obtain rapidly an accurate measure of the degree of their toxicity. Among the factors influencing the production of the toxic products, the species and stage of maturity of plant material added, the water content and pH of the soil, and length of decomposition period seemed most important. Substances capable of reducing the respiration of tobacco seedlings by 50 to 90% were consistently obtained, when any of the above mentioned plant residues had been decomposing for 15 to 25 days under conditions of high soil moisture and when the pH of the soil solution was below 5.5 throughout this period. Timothy gave rise to substances possessing the highest toxic activity, followed by corn, then rye, and finally tobacco. Aqueous extracts of unamended soil or of macerated plant tissues prepared either before decomposition had taken place or when decomposition was inhibited by autoclaving the soil were not toxic. The toxic substances, obtained by water extraction, exhibited an inhibiting effect on respiration of tobacco seedlings after an exposure of less than one hour and also induced darkening and necrosis of root cells. Some extracts affected the cells of the apical meristem most severely while others affected only the cells of the elongation region. While the toxic substances have not been identified, they were relatively nonspecific in their action, affecting tobacco, timothy, and barley in approximately the

same manner, and in many instances possessed also antifungal activity. They were soluble in water, insoluble in petroleum ether, stable in acid, and most active in the pH range 4.5 to 5.8. They were precipitated by alkali, and the activity was markedly reduced when readjusted to the acid range. They were also heat stable and did not lose their activity in storage at 1°–3° C., provided they were covered by a layer of toluene. Because of their rapid production and the marked injurious effects exerted on various plants, it is believed that these toxins may perform a significant role in the field as the primary cause of some root rots and in predisposing plants to attack by organisms not normally regarded as pathogenic. [Authors' abstract.]—Bot. Plant Path. Div., Sci. Serv., Canada Dep. Agric., Ottawa.

569. SCARASCIA, G. T.

Osservazioni preliminari sugli effetti morfologici, genetici e citogenetici dell'irradiazione di semi di *Nicotiana tabacum* L. con neutroni termici. (Preliminary observations on the morphological, genetical and cytogenetical effects of irradiating seeds of *Nicotiana tabacum* with thermal neutrons.) [English summary ½ p.] *Tabacco*, 1958, 62: 3-16, bibl. 24.

Irradiation of dormant tobacco seeds with thermal neutrons gave rise to variously abnormal plants with reduced or no fertility. Mutations also occurred in the succeeding generation, with a scope and frequency significantly greater than in the controls, thus showing genetical transmission.

570. WITTMER, G.

Ricerche sugli effetti della radiazione in *Nicotiana*. III. Comportamento del carattere "lunghezza della foglia" in piante di *N. tabacum* di 1ª generazione da radiazione neutronica. (Studies on the effects of radiation in *Nicotiana*. III. Reaction of the character "length of leaf" in plants of *N. tabacum* of the first generation following neutron irradiation.)

Tabacco, 1958, 62: 46-52, bibl. 7.

Seeds of 4 tobacco varieties were irradiated with thermal neutrons at 2 different intensities [dosage not stated], and statistical studies were carried out on the lengths of leaves of the middle tier on plants grown from these seeds. The effect of the lower dose in reducing leaf length was significant in the variety Xanthj Yakà, but not in Virginia Bright, Burley or Maryland. The higher dose gave highly significant reductions in all 4 varieties. Previous studies showed a similar, but less marked, reduction in plant height. These 2 characters are known to be correlated in untreated plants. [For part I see *H.A.*, 27: 596.]

571. WEIDEMANN, C.

Die Eignung des B-E-D-U-Verfahrens zur Setzlingsanzucht. (The suitability of the B-E-D-U method for raising seedlings.) [Russian and English summaries 15 and 13 lines.]

Ber. Inst. Tabakforsch. Dresden, 1958, 5: 40-50, bibl. 2, illus.

B.E.D.U is the German abbreviation for a system in which soil heating, water heating, soil sterilization by steam and sub-irrigation are combined for the preparation and the management of tobacco seedbeds. The installation, operation and benefits of the system are described.

572. TEJWANI, K. G., AND VENKATARAMAN, K. V.
Use of kriliun as a soil conditioner in flue-cured tobacco nurseries.

Indian Tobacco, 1958, 8: 95-9, bibl. 10.

Applied at rates of 125, 250 and 500 lb./acre, kriliun had little effect in improving growth or reducing the incidence of damping-off, nor did it appreciably alter the physical properties of the soil.—Cent. Tob. Res. Inst., Rajahmundry.

573. ČIKOV, P. V.

The use of peat for raising tobacco seedlings. [Russian.]

Tabak, 1958, 19(2): 19.

In trials in Abhazia, where F.Y.M. is scarce, mixtures of equal volumes of peat and soil or of peat and F.Y.M., or of F.Y.M., peat, sand and soil plus ½% by volume of lime produced early, healthy tobacco transplants. In soil alone the seedlings took 7–10 days longer to develop.

574. KAY, J. M.

Planting in pots.

Rhod. Tobacco, 1958, No. 17, p. 22.

A grower describes the encouraging results he has obtained in raising flue-cured tobacco seedlings in polythene pots. The pots used are cylinders 3 in. in diameter and 4 in. deep and open at both ends. They are filled with fumigated and fertilized soil, and sufficient seeds are sown in each to ensure the development of at least one seedling per pot. Surplus seedlings are discarded. In planting out the pots are placed in the holes before watering, and the pots are then slipped off and the holes closed.

575. PATEL, H. K., PATEL, R. C., AND PATEL, R. M.

Effect of various recent insecticides on the soil-borne insect pests of tobacco in nursery.

Indian Tobacco, 1958, 8: 89-93, bibl. 6.

Tested against 11 kinds of nursery insect pest aldrin and dieldrin, both as 0.05% suspensions at 2½ gal. per 48 sq. ft., proved the most effective. The other materials tried, namely DDT, Folidol and endrin, also gave adequate protection.—Inst. Agric., Anand, Bombay St.

576. COLBRAN, R. C., AND SAUNDERS, G. W.
Root-knot nematode control in tobacco seedbeds.
Qd J. agric. Sci., 1957, **14**: 307-9, bibl. 3.
 Results from 2 trials show that burning stacked wood or antbed (inner woody material of termite mounds) on the soil is the most effective method of sterilizing tobacco seedbeds. There was good control of weeds and nematodes (*Meloidogyne javanica*) on the plots treated with methyl bromide, but the seedlings from these plots were smaller than those raised on the burnt soil. EDB controlled the nematode but not the weeds, and Vapam 4-S controlled the weeds but not the nematode.
 J.R.L.
- Planting and growth.*
577. OSBORNE, R. M.
Effect of plant population on yield and quality of tobacco.
Rhod. Tobacco, 1958, No. 17, p. 4.
 Plant spacings of 18, 21, 24 and 30 in. in rows 3 ft. 6 in. apart were compared at Trelawney Research Station in 1956-57. Yield per acre increased with closer spacing, but the grade index decreased. Allowing for this effect on quality and also for the increased labour required for close spacing it would seem desirable not to reduce spacing in the rows below 24 in.
578. PUZZILLI, M.
 Il peso delle foglie curate di tabacco Kentucky in relazione alla distanza di trapianto, cimatura, fioritura e posizione delle foglie sullo stelo. (The weight of cured leaves of Kentucky tobacco in relation to planting distance, topping, flowering and position of the leaves on the stem.) [English summary $\frac{1}{2}$ p.]
Tabacco, 1958, **62**: 17-30, bibl. 3.
 Factors increasing the average weight per cured leaf were: increasing spacing from 90 $\times$ 90 to 100 $\times$ 100 cm., harvesting at commercial maturity instead of 10 days earlier (particularly in topped plants), and topping (especially when only 8 instead of 12 marketable leaves were left). The higher the harvested leaves on the stem, the greater was their weight, differences being enhanced by wider spacing, later harvesting and low topping.
579. ANON.
Spacing and topping suitable for Desi tobacco (*N. tabacum*) in North Bihar.
Indian Tobacco, 1958, **8**: 105.
 Spacing at 3 ft. $\times$ 2 ft. and topping at 14 leaves gave double the yield obtained with 3 ft. $\times$ 3 ft. spacing and 8-leaf topping; quality was also improved.
580. ANITIA, N., AND ILLE, C.
 Variation des caractères morphologiques et biochimiques du tabac sous l'influence du milieu. (Variation in morphological and biochemical characteristics of tobacco caused by environment.)
 From abstr. in *Rev. int. Tabacs*, 1958, **33**: 115.
 In a study of 20 varieties in 7 field experiments in Roumania it appeared that plant height and leaf length and breadth varied appreciably and were determined as much by environment as by heredity. Leaf number varied little, and two thirds of such variation as did occur was attributable to heredity. Nicotine content varied greatly and was equally influenced by the two factors. Nitrogen compounds and resins and, to an even greater extent, soluble carbohydrates and the Smuc coefficient were determined mainly by heredity.
- Nutrition and irrigation.*
 (See also 524, 625c.)
581. CLARK, F., HARRIS, H. C., AND LUNDY, H. W.
Fertilization and culture of flue-cured tobacco.
A.R. Fla agric. Exp. Stats, 1956-57, pp. 359-60.
 Tobacco was grown after 7 different grasses. Average yields after fumigation were 1,143 lb. per acre compared with 1,166 lb. without fumigation. Fertilizer was applied at 1,200 lb., 1,500 lb. or 1,800 lb. per acre, and dollar returns were 597, 568 and 572 per acre, respectively. Yields ranged from 832 lb. per acre in the fallow control to 1,645 lb. per acre following bahia grass. Two methods of culture (flat vs. bed) and 3 fertilizer rates (1,200 lb., 1,500 lb. or 1,800 lb. per acre) were also tested on a fine sand. Rates of fertilizer had no significant effects. Average acre yields were 1,355 lb. for flat culture and 1,731 lb. for bed culture.
582. TEJWANI, K. G., VENKATARAMAN, K. V., AND KURUP, C. K. R.
Growth studies on and nutrient uptake by cigar tobacco. Part II. The absorption of nutrients by cigar tobacco at different stages of growth.
Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 27-9, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1150.
 Mature cigar tobacco was found to have accumulated the following amounts of nutrients in lb. per acre: N 80, K₂O 150, P₂O₅ 20, CaO 140, Mg 45, Na₂O 5, S 15 and Cl 100; about 30 lb. nicotine had been synthesized. Only 4-7% of the total nutrients were absorbed during the first 6 weeks after transplanting, but during the next 3 weeks (active phase) about 60% were absorbed, and between the 11th and 13th weeks (maturation

phase) 25 to 40% were absorbed. About 65% of the nicotine was formed after topping. An equilibrium between anions and cations in the plant was found to exist for each growth phase. [For part I see *H.A.*, 28: 3814.]

583. AMIN, J. L., PARIKH, N. M., AND MEHTA, B. V.

Chemical characters of bidi tobacco.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 62-4, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1057.

The upper leaves of bidi tobacco plants, which were the best in quality, were richer in volatile oil and K, but poorer in ash and Ca, than the lower leaves. N and nicotine contents declined only slightly from the top to the bottom leaves. Of 3 successive harvests the first was richest in silica, K and volatile oil, but poorest in Ca, Cl and acid-soluble minerals. N had a substantial effect on leaf quality.

584. BRELAND, H. L., AND PRITCHETT, W. L.

Effect of fertilizer sources and levels on cigar-wrapper tobacco as related to soil and plant analyses.

A.R. Fla agric. Exp. Stats, 1956-57, p. 147.

On a soil high in exchangeable Ca, Mg, K and P the average yield from plots receiving organic N was 194 lb. per acre more than from plots receiving inorganic N. A low rate of inorganic P (90 lb. P_2O_5 per acre) resulted in higher leaf yields than did heavier applications. The only soil treatment which appeared to affect glowing capacity was Mg, which reduced the period of glowing from an average of 5.6 seconds where no Mg was applied to 4.8 sec. when 300 lb. MgO per acre were applied. The addition of Ca improved the ash colour, but Mg additions were detrimental. The crop index showed that rates of 900 lb. CaO and 300 lb. MgO improved tobacco quality. The N treatment which produced the highest crop index was the middle rate (175 lb. per acre) of inorganic N. An organic source of P resulted in a higher crop index than did inorganic sources. Increasing K from 150 to 275 lb. K_2O per acre also increased the crop index.

585. MERKER, J.

Die Stickstoffdungung des Tabaks. (Nitrogen manuring of tobacco.) [Russian and English summaries $\frac{3}{4}$ p. each.]

Ber. Inst. Tabakforsch. Dresden, 1958, 5: 51-110, bibl. 44.

During the years 1950 to 1956 32 experiments on nitrogen manuring were carried out, both with different amounts of N and with a variety of N fertilizers, which led to the following results: (1) Growth and development of tobacco were advanced by increasing amounts of N up to a critical limit which varied with soil, climate, etc.

The chlorine content of potassium-ammonium nitrate checked plant development slightly in most cases. (2) Up to the critical limit leaf yields were raised by increasing the supply of N, but beyond that limit yields of seed were raised rather than those of leaf. Differences in yield due to differences in the type of N fertilizer were very small on heavier soils. On sandy loam soils with a pH of 6.5-7.0 the best yields were obtained with ammonium sulphate. On light soils late applications of calcium cyanamide proved somewhat toxic. (3) Fineness of leaf improved with increasing amounts of N, potassium-ammonium nitrate yielding the finest product. (4) Hygroscopicity was hardly affected by N, apart from a tendency to increase after potassium-ammonium nitrate applications. (5) Under the conditions of heavy rain obtaining during the experiment total N content and protein N rose only very slightly with increasing N supply, proteins being in general more constant than total N content. Nicotine content, however, was correlated more closely with increased applications of N. The type of N fertilizer used had no effect on N content. (6) Reducing substances declined with increasing amounts of N, but the sugar content was not influenced by N. (7) The ratio $CaO : K_2O$ rose with increasing amounts of N, especially when potassium-ammonium nitrate was applied. The chlorine content of the leaf was largely determined by the soil, although applications of potassium-ammonium nitrate raised it slightly.

586. KHEMCHANDANI, H. T., KRISHNAN, A. S., AND ANANTHARAMAN, R.

Nitrogen manuring of cigar tobacco with ammonium sulphate and time and method of its application.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 31-4, from *CORESTA Inf. Bull.*, 1958, No. 1, pp. 1151.

In trials over 4 years on the variety Vellavazhai, grown in an irrigated sandy soil, N was applied at 60, 90, 120 and 150 lb./acre, either in bands or broadcast, and either in one application just before transplanting or in 2 equal applications before transplanting and in the row 7 weeks after transplanting. The results obtained varied with rainfall. For general purposes the authors recommend the application of 100 lb. N per acre, half in bands before transplanting and half in the rows 7 weeks later. Amounts exceeding 100 lb./acre may be detrimental to quality and burn.

587. DELOACH, L. R.

The effects of various sources of nitrogen on yield, quality, and nitrogen content of Maryland tobacco.

Diss. Abstr., 1958, 19: 203-4, being *L.C. Card No. Mic. 58-2211* of 71 pp.

The highest yields and dollar returns per acre were

produced with sodium nitrate as the nitrogen source, but the differences were not significantly greater than those obtained from other N sources except cottonseed meal (40 lb. N per acre). In most cases N source did not have any effect on dollar returns per 100 lb. of cured tobacco. The percentage of total N in the cured tobacco leaf was not significantly different for the different sources of N, but was higher in plots receiving N than in minus-N plots. In general, the percentage of total alkaloids was not significantly affected by N source, but was significantly higher with than without N. The percentage of total alkaloids was highest in leaves near the middle of the stalk (bright grades); the dull bright grades were intermediate, and the second and dull grades were lowest.—Univ. Maryland.

588. DONEV, N., AND PETROV, P.

Urea fertilization of tobacco. [Bulgarian.] *Bŭlgar. Tŭtjun*, 1957, 2: 153-4, bibl., illus., from *Abstract Card Inst. Tabakforsch.*, Dresden, No. 58/360.

Urea increased tobacco yields by 15% and quality by 29% in comparative trials with ammonium and sodium nitrate, when all were applied at 40 kg. N per ha., together with 60 kg. each of P_2O_5 and K_2O .

589. FUJIWARA, A., AND KUROSAWA, M.

The biting taste of burley tobacco leaves (nutritional physiology of burley tobacco). IV. Effects of interrelationships between phosphorus, nitrogen, iron and manganese supply on growth and quality of burley tobacco.

Nippon Dojo-hiryogaku Zasshi, 1956, 27: 297-300, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1147.

In soilless culture experiments too much Fe proved detrimental to both the growth and quality of tobacco and in some cases caused browning. Applications of P offset the adverse effects of Fe, and, conversely, applications of Fe offset the detrimental effects of excess P. These results, however, were only obtained in media which allowed normal oxidation of Fe to take place. Excess Mn also depressed growth and quality. [For parts I to III see *H.A.*, 28: 554-556.]

590. ANON.

Tobacco irrigation can pay.

Agric. Res. Wash., 1958, 7(2): 3, illus.

A 7-year co-operative study in Florida, Georgia, North Carolina and Virginia has shown that irrigating should be highly profitable in 7 out of 10 years. An average annual yield increase of 54 lb. per acre was obtained from irrigated tobacco in comparison with non-irrigated tobacco. Regular irrigations (two applications of $\frac{1}{2}$ in. per

week) from the time the plants were knee-high until mid-July gave the best yields and quality. Frequent early irrigations tended to retard root growth and to leach fertilizer below the shallow root zone.

591. MOLINA ABELA, M.

II. Memoria-resumen de trabajos realizados en el Estación de Riegos de Córdoba. 1953-1956. (**Second report on the work carried out at the Irrigation Station, Cordoba, 1953-1956.**)

An. Inst. nac. Invest. agron. Madrid, 1957, 6: 301-88.

The water requirements and the optimum times of irrigation were studied for a number of crops, the following being the results obtained for hemp and tobacco. *Hemp*: When grown for seed, hemp required 11,000-12,500 cu.m. of water per ha. per season, the best treatment for the March-sown crop being 15 irrigations ending in September. When grown for fibre only 9,000-10,000 cu.m. of water were required. *Tobacco*: Yield and combustibility were correlated with amount of irrigation in only 1 out of 4 years, when the highest yield was obtained with the heaviest application of water (5,200 cu.m./ha.), i.e., 10 irrigations including 2 after flowering; irrigation after flowering, however, reduced combustibility. Time of irrigation did not significantly affect yields but did affect combustibility, the best treatment being 3 applications during the first 12 days after planting, no irrigation for 40 days, and then 6 further irrigations at 8-day intervals, ending at flowering.

592. PARIKH, N. M., DANGARWALA, R. T., AND MEHTA, B. V.

Effect of saline waters on yield and chemical composition of bidi tobacco.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 61-2, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1166.

In pot-culture and field studies the varieties K.49 and Ras Kaliu tolerated up to 2 parts per thousand of NaCl in irrigation water, Ras Kaliu being the more tolerant. Sodium salts, with the exception of sodium sulphate, tended to reduce the nicotine content of both varieties. The starch content declined with increasing concentrations of all the salts applied. The application of NaCl increased both Na and Cl in the plant and reduced N, Ca and K.

Growth substance responses.

593. PARUPS, E. V.

Gibberellins in tobacco research.

Lighter, 1958, 28(3): 1.

The brief note records, without giving details, that work by the Tobacco Division, Ottawa, has shown

that: (1) When GA is applied to tobacco under certain conditions yield and quality may be improved and the deleterious effects of leaf elongation avoided; (2) reduced nicotine contents of tobacco leaves following GA treatment are probably due to changes in root metabolism; and (3) the application of GA increases the hygroscopicity of cured tobacco.

594. CLAGETT, C. O.

Respiration of germinating tobacco seeds—gibberellin stimulation.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxxix.

After a gibberellin solution had been used to moisten seeds before germination at 20° C., the rate of respiration 4–5 days after germination had started was twice as fast as that of seeds that had been soaked in water. After 7–8 days respiration rates became equal, but after 10 days the water-soaked seeds were respiring at twice the rate of the gibberellin-treated seeds.—Pa St. Univ., University Park.

595. STONE, G. M.

Isotopic dilution study to determine if MH is translocated as MH.

Unpubl. Rep. Naugatuck Chem. Div., 1957.

In analysing the extract from a tobacco leaf, containing C¹⁴ activity calculated as 1.03×10^{-3} g. C¹⁴ MH, by means of isotopic dilution, it was found that most of the C¹⁴ was recovered as MH.—*Weed Abstr.*, **7**, No. 2035.

596. SMITH, A. E., STONE, G., AND DAVIES, M. E.
Distribution of C¹⁴ MH in the flue cured tobacco plant.

Unpubl. Rep. Naugatuck Chem. Div., 1957.

Tagged MH at 0.02 mc/mM was applied at 100 µg. MH/plant to 3 central leaves of plant A (leaves 6, 7 and 8). The same quantity was applied to plant B by allowing the solution to flow down the stem between leaves 3 and 12. The MH was applied to 1 leaf (number 8) in the centre of plant C. The dosage used inhibited all axillary bud growth. In another experiment 22.5 mg. of tagged MH at 0.1 mc/mM was applied to the top leaf, number 1, and the procedure outlined above was used. The axillary buds continued to grow at this level of MH. The distribution patterns are presented.—*From Weed Abstr.*, **7**, No. 2036.

597. NUSBAUM, C. J.

The response of root-knot-infected tobacco plants to foliar applications of maleic hydrazide.

From abstr. in *Phytopathology*, 1958, **48**: 344.

Four levels of MH were applied to young tobacco plants after transplanting to a soil infested with *Meloidogyne incognita*, and to non-infested soil.

Root-knot infection reduced the effect of MH on plant growth. Foliar applications of MH, made 7 days after transplanting at 10 and 25 mg. per plant, inhibited gall development and nematode reproduction.

Physiology and biochemistry.

598. MISRA, B., AND MAHAPATRA, L. N.

Effects of photoperiod treatment on certain varieties of *Nicotiana tabacum*.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 47-9, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1075.

A bidi variety S.20 and a chewing variety N.P.70 were subjected to 8-hr. days and to continuous light, while controls were kept in normal light conditions. With S.20 both treatments advanced flowering. With N.P.70 long-day treatment had the more marked effect, and this variety is therefore classed as a long-day plant in contrast to all other *Nicotiana* varieties which have been described as either short-day or indeterminate plants. By comparison with plants grown in long or normal days, plants grown in short days made poor growth and showed symptoms similar to those of iron deficiency.

599. PETRENKO, A. G., AND BELJAKOVA, Z. P.

Changes in the chlorophyll content of tobacco leaves during growth and maturation. [Russian.]

Tabak, 1958, **19**(3): 53-4, bibl. 8.

Chlorophyll determinations were made on the leaves of 3 varieties of cigarette tobacco during 4 seasons at 4 stages of growth, i.e. seedling stage, intensive growth, cessation of growth and technical maturity. The chlorophyll content was low at first, increased rapidly after transplanting, and then declined at first slightly and finally rapidly in the mature leaf. While the general pattern of chlorophyll synthesis was similar in all 3 varieties, the actual quantities, rates of synthesis and hydrolysis varied and were also affected by weather conditions.

600. MACDOWALL, F. D. H.

Exudation of sap by tobacco roots.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xxxvi.

Following shoot removal tracheal exudation of sap by tobacco root systems occurred in a persistent diurnal rhythm. The activity was not simply related to the growth of root tips, nor to their O₂ consumption nor to the CO₂ evolution of the whole root system. The rate of exudation of nicotine roughly paralleled that of sap, but the nicotine concentration in the sap increased with time. Exudation of sap and of nicotine was increased by anaerobiosis.—Canada Dep. Agric., Ottawa.

601. PYRIKI, C., AND MÜLLER, R.
Die Veränderung der Alkaloide innerhalb der Pflanzenorgane verschiedener *Nicotiana*-Arten in Abhängigkeit vom Alter der Pflanzen. (Alkaloid changes in the plant organs of different *Nicotiana* spp. in relation to the age of the plants.) [Russian and English summaries $\frac{3}{4}$ p. each.] *Ber. Inst. Tabakforsch. Dresden*, 1958, 5: 127-44, bibl. 10.
- In contrast to earlier findings [H.A., 27: 1625] it has been shown that when tobacco seedlings are in the first developmental stage the stems and not the roots, are in most cases richest in alkaloids. These plants were analysed at an earlier stage than in the previous experiment. At a later stage the stems lost the capacity to accumulate alkaloids, and the roots had the highest alkaloid content, until later on again some *Nicotiana* spp. transferred the bulk of their alkaloids to the leaves; other species, especially those low in alkaloids, retained most of their alkaloids in the roots. In all plants the alkaloid content decreased with age. Among the organs harvested at stages I and II the leaves weighed much more than the stems, whereas at stage III stems showed the highest weight. The distribution of alkaloids in these three organs, expressed in grammes, corresponded closely to their temporary dominance, except in the case of *N. longiflora* which has a low nicotine content. The main alkaloids found in various tobacco varieties and *Nicotiana* spp. are recorded. [See also H.A., 28: 2749.]
602. BOSE, B. C., GUPTA, S. S., AND MOHAMED, S.
Enzymes in synthesis of nicotine alkaloids in tobacco plants.
J. Indian chem. Soc., 1958, 35: 81-2, from abstr. in *J. Sci. Food Agric.*, 1958, 9: ii-154.
- Experiments on the biogenesis of nicotine alkaloids in *Nicotiana tabacum* and *N. glauca* have shown that the synthesis of nicotine is accelerated by the addition of amino-acids and inorganic nitrates. Synthesis, however, is not affected by the further addition of isolated enzymes or factors such as riboflavin and nicotinic acid.
603. SCHRÖTER, H-B., AND ENGELBRECHT, L.
The synthesis of nornicotine in the roots of different *Nicotiana* species. [In German?] *Arch. Pharm. u. Ber. disch. pharm. Ges.*, 1957, 290: 204-6, from *Biol. Abstr.*, Sect. D, 1958, 32, Abstr. 28,537.
- It was demonstrated by means of root cultures that the roots of *N. alata*, *N. paniculata*, *N. rustica*, *N. sylvestris* and *N. glauca* are able to synthesize small amounts of nornicotine, thus disposing of the theory that nornicotine is only synthesized in the shoots by the demethylation of nicotine translocated from the roots. In the first 4 species the dominant alkaloid in the roots is nicotine, whereas in *N. glauca* it is anabasine. The shoots of *N. alata* contain only 0.001-0.01% of alkaloids compared with 0.1-0.2% in the roots, but it has been shown that this difference is not due to the breakdown of alkaloids within the shoots.
604. IL'IN, G. S.
The biosynthesis of tobacco alkaloids. [Russian.] *Tabak*, 1958, 19(2): 11-15, bibl. 15.
- In one series of experiments C^{14} -labelled sodium bicarbonate, acetic acid, glycine and tyrosine were applied in a nutrient solution to *Nicotiana tabacum*, *N. glauca* and *N. glutinosa* plants and cuttings. In another test labelled nicotine was infiltrated into leaves of the same species and also into leaves of *N. multivalvis* and *N. longiflora*. Alkaloid formation was shown to begin immediately after the absorption of the labelled compounds, but locational differences were found, nicotine forming in the roots [see also H.A., 28: 3824], nornicotine in the leaves through the demethylation of nicotine and anabasine in all organs. The alkaloids appear to be biologically active, since they participate in such metabolic processes as demethylation and redox reactions.
605. SOLT, M. L., AND DAWSON, R. F.
Alkaloid synthesis by excised root cultures of *Nicotiana glauca*.
Abstr. in *Plant Physiol.*, 1958, 33(Suppl.): xlv.
- Excised root cultures of *Nicotiana glauca* were grown aseptically in a modified White's medium. The rates of nicotine and anabasine production were studied concurrently. Feeding isotopically labelled compounds to these cultures indicated that the pyridine ring of nicotine is produced in this species from nicotinic acid, as had been shown earlier in the case of *N. tabacum* [see H.A., 28: 1574]. Anabasine biosynthesis followed a similar pathway with respect to nicotinic acid. Lysine was incorporated into anabasine to a much greater extent than it was into nicotine. Specific activities and radiochemical yields of the alkaloids were much greater than had been obtained with *N. tabacum*.—Columbia Univ., N.Y.
606. LEETE, E.
The biogenesis of the *Nicotiana* alkaloids. VI. The piperidine ring of anabasine.
J. Amer. chem. Soc., 1958, 80: 4393-4, bibl. 12.
- When cadaverine-1-5- C^{14} dihydrochloride was fed to 5-month-old *Nicotiana glauca* plants growing in a nutrient solution, the anabasine formed by them was radioactive. The cadaverine was incorporated into the piperidine ring and there was only negligible activity in the pyridine ring. Radioactive cadaverine was also incorporated into anabasine by excised shoots of *N. glauca*, the percentage incor-

porated being much higher than that of plants fed radioactive lysine. These results confirm that in *N. glauca* alkaloid biosynthesis occurs in the aerial parts as well as the roots. Taken in conjunction with the results of previous studies on nicotine biosynthesis in *N. tabacum* [H.A., 28, 3823 and earlier] they also suggest the possibility that the process alkaloid synthesis in plants may in general occur at a slow rate compared with other processes such as photosynthesis.—Univ. Calif., Los Angeles.

607. LEETE, E.

Biosynthesis of anabasine: preferential incorporation of acetate into the pyridine ring.

Chem. Ind. Lond., 1958, No. 45, p. 1477.

Tests, in which sodium acetate labelled with C^{14} was absorbed by excised shoots of *N. glauca*, showed that the acetate was preferentially incorporated into the pyridine ring of anabasine. Nicotinic acid derived by oxidizing the radioactive anabasine with nitric acid showed similar activity. When, however, the test was repeated, but with the addition of inactive nicotinic acid in the culture solution, the activity shown by the anabasine formed was negligible, which suggests that the abundant supply of inactive nicotinic acid prevented the biosynthesis of radioactive nicotinic acid from the acetate. In another experiment the feeding of labelled sodium acetate to intact plants of *N. tabacum* resulted in activity in both the pyridine and pyrrolidine rings of nicotine.

608. REID, W. W.

Biosynthesis of scopoletin and caffeic acid in *Nicotiana tabacum*.

Chem. Ind. Lond., 1958, No. 44, pp. 1439-40, bibl. 5.

Young tobacco plants were fed for 5 days with C^{14} -labelled precursors while growing under continuous illumination. The results indicate that both scopoletin and caffeic acid are directly derived from phenylalanine or a C_6-C_3 unit produced from it. In neither case was acetate from phenylacetic acid incorporated.—Res. Dep., Carreras Ltd., London.

609. KOENIG, D. F., PALMER, J. K., AND LIKES, C. J.

Separation of tobacco leaf proteins by centrifugation across a density boundary.

Science, 1958, 128: 533-4, bibl. 4, illus.

This paper describes a relatively simple procedure for separating the two major protein fractions, I and II, present in green tobacco leaves. It gives a high recovery of both fractions, with an over-all recovery of N amounting to 97% of that present in the clarified extract. Although used so far only to separate tobacco proteins, the method should be applicable to the separation of other mixtures containing macromolecular constituents possessing sedimentation constants that vary appreciably.—Va Inst. sci. Res., Richmond.

Diseases and pests.

(See also 395, 625b, e, 1.)

610. LUCAS, G. B., AND WINSTEAD, N. N.

Control of tobacco mosaic with an antiviral agent.

From abstr. in *Phytopathology*, 1958, 48: 344. Tomato (Rutgers) and flue-cured tobacco (Dixie Bright 101) plants were treated in the greenhouse with sprays of 100 and 500 p.p.m. of crude Cyto-*virin* (8%) before inoculation with tobacco mosaic virus. After 30 days 70% of the treated plants showed no symptoms of mosaic, whereas among control plants 100% showed symptoms within 14 days. In field tests tobacco transplants were sprayed with partially purified Cyto-*virin* (85%) at 5, 25 or 50 p.p.m. 24 hours before pulling the transplants with virus-contaminated hands. The percentage of plants showing symptoms after 60 days ranged from 20% to 56% with Cyto-*virin* treatment, compared with 100% in inoculated controls and 16% in non-inoculated controls.

611. STAHMANN, M. A., AND GOTHOSKAR, S. S.
The inhibition of the infectivity of tobacco mosaic virus by some synthetic and natural polyelectrolytes.

Phytopathology, 1958, 48: 362-5, bibl. 11.

Reduced infectivity occurred when polyglutamic acid, polyacrylic acid, sodium pectate and culture filtrates of *Trichothecium roseum* were mixed with TMV or were applied before, but not after, leaves of *N. glutinosa* and a *N. glutinosa* × *N. tabacum* hybrid had been inoculated with TMV. The evidence obtained suggests that these compounds act upon the plant cells rather than upon the virus.—Univ. Wis., Madison.

612. POWELL, N. T., AND NUSBAUM, C. J.

The effect of root-knot nematode resistance on the incidence of black shank in tobacco.

From abstr. in *Phytopathology*, 1958, 48: 344.

In Coker 139 and Dixie Bright 101, black shank incidence was higher among plants inoculated with root-knot nematode (*Meloidogyne incognita*) than among those not inoculated. In the presence of the nematode, root-knot-susceptible segregates were more susceptible to black shank than were root-knot-resistant segregates. It is concluded that loss from black shank in resistant varieties grown in the presence of both pathogens would be reduced by combining root-knot resistance with black shank resistance.

613. KUITERT, L. C., AND TISSOT, A. N.

Influence of cultural practices on the incidence and control of insect infestations in flue-cured tobacco.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 93-4.

Aldrin, chlordane and endrin when applied dry

with fertilizer to newly-set tobacco plants were not phytotoxic, but when aldrin and endrin were applied as emulsifiable concentrates in transplant water severe plant injury occurred. When aldrin as a wettable powder was used in the transplant water no injury occurred. Excellent control of cutworms was obtained by a blanket application of bait containing 2% chlordane and 2.4% toxaphene.

614. TAPPAN, W. B., AND BAKER, A. S.
Effects of soil treatments with insecticides on shade-grown cigar-wrapper tobacco.

A.R. Fla agric. Exp. Stats, 1956-57, p. 327.
Broadcast applications of 8 lb. actual chlordane gave the best control of cutworms without plant injury. At 6 lb. per acre control was almost as good, fewer replants were required and growth was significantly increased. Chlordane applied in transplanting solution treatments was phytotoxic.

615. TAPPAN, W. B.
Control of insects attacking cigar-wrapper tobacco.

A.R. Fla agric. Exp. Stats, 1956-57, p. 327.
Three and 4% Thiodan were almost as effective as 10% endrin in controlling budworms, hornworms and cabbage loopers. Thiodan gave better control of green peach aphid than endrin. Good control of hornworms was obtained with 10% Sevin, and 10% Trithion also gave fair control of aphids and hornworms.

Harvesting, curing and fermentation.

(See also 625d, g, h, i, k.)

616. ENDEMANN, W.
Die Bedeutung der Ganzpflanzenernte für den inländischen Tabakanbau. (**The importance of the stalk-cutting method for harvesting German-grown tobacco.**) [Russian and English summaries about 30 lines each.]
Ber. Inst. Tabakforsch. Dresden, 1958, 5: 5-39, bibl. 15.

Experiments showed, among other things, that: (1) In the event of harvesting the lowest leaves at the right stage of maturity and the rest 3-4 weeks later by the stalk-cutting method the reduction in yield is about 9%, as compared with the priming of all leaves. (2) The variety Wohlsdorfer Burley is well suited to harvesting by the stalk-cutting method, whereas tobaccos of the cigar type harvested in this way lose their colour. (3) Harvesting by the stalk-cutting method changes the composition and improves the quality of cigarette tobaccos. (4) Where harvesting is to be done by the stalk-cutting method nitrogen applications should be raised by 30-40 kg./ha. and the number of plants per ha. reduced by about 12%. (5) In comparison with priming these measures will secure equal yields, improve quality, and reduce

labour requirements by about 25%. (6) Harvesting by the stalk-cutting method increases the need for curing space by about 20%, and a different method of hanging is suggested.

617. TOBACCO RESEARCH BOARD OF RHODESIA AND NYASALAND.

Barn construction and curing procedure.

Bull. Tob. Res. Bd Rhod. Nyasa, 7, 1958, pp. 16 plus plans.

Recommendations, supported by 9 clear plans, are given for the construction of flue-curing barns. Details supplied include general lay-out and the installation of furnaces and ventilators. The quantities of materials needed for a set of 4 barns are listed. The recommended curing procedure is also outlined, and some common faults are mentioned, together with the effects they produce.

618. TRIFU, I., AND PETRESCU, M.

Essais expérimentaux de séchage des feuilles vertes de tabac par les rayons infrarouges. (**Experimental drying of green tobacco leaves by infra-red rays.**)

From abstr. in *Rev. int. Tabacs*, 1958, 33: 114.

In experiments in Roumania good results were obtained using an intermittent irradiation of 3 minutes on and off. Weight loss was 1-2% less than by hot-air drying but the capacity to absorb oxygen was reduced. Flavour and aroma were better than those of sun- or hot-air-dried tobacco. 1 kg. of dry tobacco needed 679-5,628 w. of electricity for drying by intermittent irradiation and 679-7,691 w. by continuous irradiation.

619. MYERS, J. M., CLARK, F., AND HARRIS, H. C.
Curing bright-leaf tobacco grown under different levels of nitrogen.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 35-6, 49, illus.

Cured tobacco produced on plots that had received 96 lb. N per acre was valued at 46.15 cents per lb. after yellowing at 90° F., and at 49.5 cents per lb. after yellowing at 100° F. With tobacco from plots that had received 24 lb. N per acre the value was essentially the same (51.45 and 51.9 cents per lb.) for both yellowing temperatures. There were also indications that a lower relative humidity during yellowing should be maintained for tobacco grown with high N fertilization than for tobacco grown with low N fertilization.

620. SASTRY, A. S.

Some observations on the rates of proteolysis during flue-curing.

Proc. 1st Conf. Tob. Res. Wkrs, Bangalore, 1957, pp. 56-7, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1055.

The rate of hydrolysis of proteins during flue-curing depends on the ratio proteic N/soluble N (minus nicotinic N) in the leaf at harvest. In the intact plant this ratio is influenced by certain hormones produced by the roots, but after a leaf is detached the hormonal effect ceases and hydrolysis can occur.

621. PENN, P. T., STEPHENS, R. L., AND WEYBREW, J. A.

The *in vitro* synthesis of a "cherry red" pigment.

Tobacco, N. Y., 1958, **147** (4): 99-102, bibl. 4, illus.

The oxidation of chlorogenic acid, caffeic acid, and *d*-catechin by polyphenol oxidase and peroxidase from tobacco leaves has been carried out *in vitro*. In the presence of nornicotine, the oxidative derivatives of these polyphenols undergo secondary complexing reactions with the formation of cherry red pigments. No red color was produced when nicotine or nicotinic acid was substituted for nornicotine in the model systems. The synthesis of red pigment was found to be dependent upon the enzymatic oxidation of the polyphenols to their corresponding quinones. In the absence of enzyme, or when the enzymes had been rendered non-functional by heat or chemicals, the reaction did not take place. Similarly, in the presence of reducing agents such as ascorbic acid, the development of color was prevented. By the use of inhibitors selective for polyphenol oxidase, the peroxidase from tobacco was demonstrated to be more effective as the mediator of cherry red synthesis under these experimental conditions. [Authors' summary.]—N.C. St. Coll., Raleigh.

622. IZQUIERDO TAMAYO, A., DE MEDEIROS ALVAREZ, A., AND COTA GALÁN, R.

Estudios sobre la flora bacteriana del tabaco. II. Observaciones sobre la multiplicación de bacterias inoculadas al tabaco y modificaciones que producen en el mismo. (Studies on the bacterial flora of tobacco. II. Observations on the multiplication of bacteria inoculated into tobacco and on the changes they induce in tobacco.) [English summary $\frac{1}{2}$ p.] *Bol. Inst. nac. Invest. agron. Madrid*, 1958, **18**: 1-35, bibl. 17.

When cured tobacco leaves were inoculated with pure cultures of bacteria applied in water, the bacteria, especially *Micrococcus* spp., increased in number under suitable conditions of temperature and humidity. The inoculated tobacco had a better aroma than the controls, especially when inoculated with *Micrococcus* spp. or a mixture of *Micrococcus* and *Bacillus* spp. In tobacco inoculated with *Micrococcus* the percentage of protein N decreased, whereas the percentage of soluble N increased;

during fermentation the alkaloid content of inoculated tobacco decreased and the pH increased. Leaves treated with bacterial cultures had a higher moisture content than those treated with water or with an infusion of tobacco. [For note on part I see *H.A.*, 27: 617h.]—Inst. Biol. Tabac., Seville.

623. ASMAEV, P. G., AND TRUBNIKOV, V. F.

On the problem of fermenting tobacco in a loose mass, [Russian.]

Tabak, 1958, **19** (2): 21-3.

Continuing earlier work [see *H.A.*, 28: 2773] diagrams and charts are given showing the effect of time, temperature and moisture content on the consolidation of the leaf during the initial stage of fermentation, i.e. until 48° C. is attained. From initial densities of 37-65 kg./cu. m. an average of 88 kg./cu. m. was reached at the end of this stage, which took under 50 minutes, and 93 kg./cu. m. after 50-60 minutes. The moisture content also increased by an average of 14% during this stage.

624. TOTUBALIN, N. N.

An investigation on the process of tobacco fermentation by means of electric current from the mains. (Second communication.) [Russian.]

Tabak, 1958, **19** (2): 29-32.

Continuing studies of electrical fermentation [see *H.A.*, 28: 2772] the moisture content, enzyme activity, composition, flavour and grade index were compared for tobacco that had been fermented with the aid of an electric current and for tobacco that had been fermented in the usual way at 50° C. In general, differences were small, but slightly in favour of electrical fermentation.

Noted.

- 625.

a ANON.

Essais de culture en France de la variété Burley, en 1957. (Trials of burley tobacco in France in 1957.)

Rev. int. Tabacs, 1958, **33**: 123-5.

First season's trials with Burley Guiseppina very encouraging.

b BERGER, P.

Die Symptomausprägung einiger Virose auf Tabak unter Freiland- und Gewächshausbedingungen. (Symptom expression of some tobacco viruses under field and greenhouse conditions.) [Russian and English summaries 7 lines each.]

Ber. Inst. Tabakforsch. Dresden, 1958, **5**: 111-26, bibl. 5.

Environment and other factors affecting symptom expression.

- c (CASTEL, —, AND OTHERS.)
La fertilisation des terres à tabac dans quelques régions de France. (**The manuring of tobacco soils in certain parts of France.**) *Rev. int. Tabacs*, 1958, **33**: 103-7, 118. Practices in the regions of Rumilly, Erstein, Damazan and Thouars.
- d GROSSMAN, J. D., AND STEDMAN, R. L.
Composition studies on tobacco. II. Isolation and identification of stigmasterol from flue-cured leaves.
Tobacco, N. Y., 1958, **147** (11): 22-3, bibl. 10. For Part I, see *H.A.*, 28: 3826, and Part III 625k below.
- e LEGGE, J. B., AND COLE, J. S.
Controlling pests and diseases by spraying.
Rhod. Tobacco, 1958, No. 17, pp. 14-15. Methods of application are discussed.
- f McDONALD, I., COLE, J. S., AND LEGGE, J. B.
Notes on seedbed management.
Rhod. Tobacco, 1958, No. 17, pp. 21-2. Preparation, seeding, watering, mulching with grass, and disease and pest control.
- g MÜLLER, O.
Das Verhalten der Temperatur und der relativen Luftfeuchtigkeit in Fermentationskammern. (**The behaviour of temperature and relative humidity in fermentation chambers.**) [Russian and English summaries $\frac{1}{2}$ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1958, **5**: 155-63, bibl. 1.
In chambers varying in size and insulation.
- h MÜLLER, R.
Der Sauerstoff-Index als Anzeiger für die Beendigung des technischen Fermentationsprozesses. (**The oxygen index as an indicator of the termination of the technical fermentation process.**) [Russian and English summaries $\frac{1}{2}$ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1958, **5**: 145-54, bibl. 2.
- i OLLERO GÓMEZ, A., AND CORTÉS MUÑOZ, V.
Sobre la determinación del calcio en tabaco: valoración complexométrica con EDTA. (**The determination of calcium in tobacco: complexometric titration with EDTA.**) [English summary $\frac{1}{4}$ p.]
Bol. Inst. nac. Invest. agron. Madrid, 1958, **18**: 271-93, bibl. 57.
- j PATEL, G. C., SINGH, M., AND DAS, R.
Hookah and chewing tobaccos of North Bengal. I. Growing and curing.
Indian Tobacco, 1958, **8**: 75-84, bibl. 1, illus. Area, soils, varieties and cultural practices.
- k STEDMAN, R. L., AND OTHERS.
Composition studies on tobacco. III. Total 3- β -sterols in flue-cured tobacco leaves.
Tobacco, N. Y., 1958, **147** (12): 20-2, bibl. 7. The total sterol content was 0.15% DM. [For part II see 625d above.]
- l TROUTMAN, J. L., AND FULTON, R. W.
Resistance in tobacco to cucumber mosaic virus.
Virology, 1958, **6**: 303-16, bibl. 15, illus. Physiological and genetic factors.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(See also 960j, 1003.)

26. VAN BRUNT, E. R., NELSON, P. K., AND OTHERS.

Handbook on herbs.*Plants and Gdns*, 1958, **14**: 81-172, illus.

prominent feature of this handbook (pp. 85-141) is an illustrated dictionary of herbs, in which each plant is briefly described with notes on its uses (culinary, medicinal and horticultural) and method of harvesting. Among a number of shorter articles is one on methods of propagation and several on herb gardens and methods of cultivation. The various types of mint, scented geranium and thyme are also dealt with in separate articles.

27. KHAN, K. F.

A new remedy for soft rot of ginger.*Indian Fmg*, 1958, **8** (5): 28-9, illus.

The most effective preventive measures against this fungus disease are good drainage, rotation of crops, and the use of clean rhizomes. The rhizomes could also be dressed with wettable Ceresan

before storage, and Cheshunt compound applied to them and to the surrounding soil at planting time.

Drug plants.

(See also 381, 679a-c, 1, m, u.)

628. WALL, M. E., AND OTHERS.

Steroidal sapogenins. XLIII. Survey of plants for steroidal sapogenins and other constituents.

J. Amer. pharm. Ass., sci. Ed., 1957, **46**: 653-84, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 28,447.

This is a report of the chemical examination of the fourth 1,000 accessions in a survey of plants for steroidal sapogenins and is thus a continuation of the reports on the first three 1,000 accessions. Data are given for 950 samples, representing 100 families, 272 genera, and 432 identified species. Of these, 14 families, 151 genera, and 376 species are new in this series. Quantitative data are given for the occurrence of 15 steroidal sapogenins, of which two, gentrogenin and corrollogenin, are new.

Qualitative data are given for the occurrence of these groups of constituents: saponins, flavonoids, alkaloids, tannins and unsaturated sterols. There is no previously published chemical information on about 50% of the species examined. [Authors' abstract.]

629. RAOUL, Y.

La cétone 250 dans les végétaux alimentaires. (*Ceton 250 in food plants.*) [English summary 9, German 12, lines.] *Qual. Plant. Maveg.*, 1958, 3/4: 368-73, bibl. 11.

Contents of ceton 250, a highly antirachitic seco-steroid, are quoted for sugar cane juice, chestnut leaves, cabbage, chicory leaves, carrot leaves and roots, orange, lettuce, cress, asparagus and apples.—Fac. Pharm., Paris.

630. BURUIANĂ, L. M., AND OTHERS.

Variatia activității catalazice și a acidului citric la câteva plante medicinale în timpul diferitelor epoci de vegetație. (*Changes in the catalase activity and citric acid content of some medicinal plants during growth.*) [Russian and French summaries.] *Studii și cercetări știint. Acad. RPR, Baza Timișoara. Ser. agric.*, 1956, 3 (1-2): 67-77, from *Ref. Ž. (Biol.)*, 1957, No. 22, Abstr. 93,680.

Leaves: In *Nigella sativa*, *Trigonella foenum graecum*, *Papaver somniferum*, *Calendula officinalis*, *Ricinus communis*, *Cnicus benedictus*, *Coriandrum sativum* and *Carthamus tinctorius* citric acid increased during the whole growing period and especially rapidly during flowering. In *Borago officinalis* citric acid decreased during flowering, after which it increased. Catalase activity in the majority of these plants increased rapidly during flowering and then declined. In *C. officinalis* catalase activity continued to increase after flowering and in *C. benedictus* it declined during flowering and increased after. *Stems:* In most of these plants citric acid increased during flowering and then decreased, though in *N. sativa*, *T. foenum graecum*, *C. officinalis* and *B. officinalis* the acid continued to accumulate even after flowering. Catalase activity in *N. sativa*, *C. sativum* and *C. tinctorius* showed an uninterrupted increase; in *T. foenum graecum*, *R. communis* and *B. officinalis* it increased during flowering and then declined; and in *P. somniferum*, *C. officinalis* and *C. benedictus* it declined during flowering and then increased.

631. GLASSER, A. C.

A phytochemical investigation of *Amphiachyris dracunculoides* (DC) Nutt., Compositae. *Diss. Abstr.*, 1958, 18: 1812-16, bibl. 13, being *L.C. Card No. Mic 58-734* of 122 pp.

Several substances were isolated from the medicinal

plant, *Amphiachyris dracunculoides*, and most of them have been identified. An essential oil was obtained at a yield of approximately 1.7% of the dried plant, but its identification is incomplete. A method of separating the terpene hydrocarbons on silica gel has been developed.—Ohio St. Univ.

632. SCHERMEISTER, L. J.

Growth and nitrogenous constituents of *Atropa belladonna* L. as affected by different sources of nitrogen.

Diss. Abstr., 1958, 18: 1232-3, being *L.C. Card No. Mic 58-1259* of 134 pp.

Growth of *Atropa belladonna* in water cultures was better with ammonium and nitrate ions than with nitrate alone; with both N sources growth was most satisfactory at 20 mg. equivalents of N. Low levels of N stimulated root growth, while high nitrate levels increased succulence and nitrate accumulation. One-tenth or more of the total N present consisted of free amino acids. The nitrate plus ammonia source stimulated greater formation of the 5-carbon dicarboxylic acids, while the nitrate source stimulated greater production of the 4-carbon acids. The protein fraction amounted to a half or more of the total N, its composition being constant; the protein of leaf and root were similar, but differed markedly from that of the stem. The alkaloid content was greatest in roots grown in ammonia plus nitrate, and coincided with small amounts of both free and combined proline. Large amounts of alkaloid in the roots were associated with extremely large amounts of γ -aminobutyric acid, which could be an alkaloid precursor.—Univ. Illinois.

633. LEETE, E.

Biogenesis of *d*-norpseudo ephedrine in *Catha edulis*.

Chem. Ind. Lond., 1958, No. 33, pp. 1088-9, bibl. 4.

The investigation described suggests that phenylalanine is a direct precursor of *d*-norpseudo ephedrine, which is the principal alkaloid in the leaves of *Catha edulis* (known as khat, kat or Arabian tea). The results also show that the alkaloid is synthesized in the aerial parts of the plant.—Univ. Calif., Los Angeles.

634. KOŠOVÁ, V., AND CHLÁDEK, M.

Eine pharmakognostische Studie über *Datura metel* L. und *D. inoxia* Mill. (A pharmacognostic study of *Datura metel* and *D. inoxia*)

Pharmazie, 1957, 12: 620-7, from *Biol. Abstr.*, Sect. D, 1958, 32, Abstr. 24,707.

These species are often confused or considered identical. Morphological comparisons between them showed that *D. inoxia* could be distinguished by much greater plant height, deeper leaf indenta-

ions, larger capsules, a wider corolla (when slit on one edge and rolled out flat), a wider calyx, and heavier and sturdier roots. In various other characters, including root anatomy, the two species were similar. Alkaloid contents found for *D. metel* and *D. inoxia*, respectively, were:—leaves, 0.419% and 0.390%; roots, 0.370% and 0.541%; and seeds, 0.455% and 0.439%.—Univ. Brno, Czechoslovakia.

635. COSGROVE, F. P.

Freeze-drying as a pharmaceutical process for drying leaves of *Digitalis purpurea* L. and *Digitalis lutea* L.

Diss. Abstr., 1958, 18: 1809-12, bibl. 12, being *L.C. Card No. Mic* 58-692 of 112 pp.

Freeze-dried samples of *D. purpurea* and *D. lutea* were approximately twice as bulky as oven-dried samples, but no differences in cell size were apparent. Moisture and ash contents were similar in the products. More total solids were extracted from oven-dried samples of 1-year-old *D. lutea* and *D. purpurea* than from freeze-dried samples; with 1-year-old *D. purpurea* more solids were extracted from freeze-dried material. Oven-dried samples of *D. lutea* contained a higher sugar content than corresponding freeze-dried material; no significant difference was observed with *D. purpurea*. Glycol extraction from freeze-dried material was slightly quicker than from oven-dried material. Lyophilized, water-soluble extracts made from infusions of oven-dried materials contained more nitrogenous material than those made from corresponding freeze-dried material. Freeze-dried products contained more total chlorophyll and chlorophyll *a* than oven-dried products, but there was no significant difference in contents of chlorophyll *b*. Total alcoholic extracts and tinctures of oven-dried materials had a higher glycosidal content than those of freeze-dried materials, but these differences are attributed to variation in primary and secondary glycosides.—Ohio St. Univ.

636. KU, Y-T., AND TSENG, K. F.

Chemical studies on a Chinese drug, Ch'uan Hsiung (*Ligusticum wallichii* Fr.).

Scientia sin., 1958, 7: 844-7, bibl. 9, previously published in Chinese in *Acta chim. sin.*, 1957, 23: 246-9.

This drug from *L. wallichii*, formerly erroneously called *Conioselinum univittatum*, has long been used in China as a sedative and antispasmodic and for treating rheumatism. Recently it has also proved effective in hypertension therapy. The present paper gives chemical data on 4 components of the plant, namely, an alkaloid, an organic acid, a phenolic compound and a neutral principle.—*St. Materia med.*, Acad. sin., Shanghai.

637. FELKLOVÁ, M., AND MIKULECKÁ, J.

Kolísání obsahu morfinu během vegetace u rostliny *Papaver somniferum* L. (Fluctuations in the morphine content of *Papaver somniferum* during growth.) [English, Russian and German summaries $\frac{2}{3}$ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 149-64, bibl. 43, illus.

Morphine determinations were made on both irrigated and non-irrigated poppy plants. The highest morphine content was found in unripe capsules. The irrigated plants always contained more of the alkaloid than the non-irrigated. In individual organs the greatest accumulation occurred successively in the roots (0.306 and 0.276% respectively for irrigated and non-irrigated plants), the leaves (0.256 and 0.206%), the stalks (0.237 and 0.198%), and finally the capsules (0.411 and 0.338%). Drought, especially during the main growth period and during flowering, had an adverse effect on morphine accumulation.

638. ATAL, C. K.

Cytoplasmic male sterility in psyllium (*Plantago ovata* Fosc.).

Curr. Sci., 1958, 27: 268, bibl. 3.

Plantago ovata is cultivated extensively in northern Bombay State to provide psyllium or isabgol seeds for export. Both wild and cultivated *P. ovata* plants with no pollen in the pollen sacs have been found. No difference was noticed in the seed setting ability of these and normal plants since both were easily wind pollinated and no female sterility occurred. In experiments, in which normal and male-sterile plants were crossed, all normal plants, whether self- or cross-pollinated, gave normal plants at each successive generation, and all male-sterile plants used as female parents when crossed with male-fertile plants gave male-sterile plants at the next generation. It is concluded that the maternal transference of male-sterility is due to a cytoplasmic effect.—Dep. Pharmacognosy, Punjab Univ., Amritsar. J.R.L.

Essential oils.

(See also 679k, 830, 831.)

639. SPOON, W.

Etherische oliën van Nieuw-Guinea. (Essential oils from New Guinea.) [English summary 2 pp.]

Chem. Weekbl., 1958, 52: 236-9, reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen* 265, 1958, pp. 12, bibl. 7, illus.

Analyses are given for oils from the bark of *Cinnamomum culilawan* and *Cryptocarya massoy*, from the leaves of *Cymbopogon nardus* and *Pogostemon cablin* (patchouli) and from the roots of *Vetiveria zizanioides*.

640. LUYENDIJK, E. N.

Over de vorming van vluchtige olie bij enkele umbelliferae. (**The formation of essential oil in some umbelliferous plants.**)

Pharmaceut. Weekbl., 1957, **92**: 349-74, illus., from *Biol. Abstr.*, Sect. D, 1958, **32**, Abstr. 28,430.

In 4 species, *Anethum graveolens*, *Carum carvi*, *Cicuta virosa* and *Oenanthe aquatica*, intensive oil formation occurs from flowering up to the time the fruits reach their maximum fresh weight. Thereafter oil synthesis ceases. As the fruits develop changes occur in the oil, its specific gravity, its content of esters and carbonyl compounds and in some cases its refractive index increasing and its content of tertiary alcohols decreasing.—Univ. Leiden.

641. CHLÁDEK, M., AND KOŠOVÁ, V.

Příspěvek k biologii růstů merlíku vonného a zjištění nejvhodnější sklizně natě. (**A contribution to the growth biology of *Chenopodium* and the determination of the most suitable harvest date.**) [Russian summary $\frac{1}{2}$ p.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 331-8, bibl. 36.

Chenopodium ambrosioides var. *anthelminticum* harvested twice, yielded 33% more herbage (66.86 kg./are [100 sq. m.]) than *C. ambrosioides* (48.13 kg./a.). The essential oil content in both types was greater in the flowers (up to 3.4%) than in the leaves (up to 0.9%), and during development it reached maxima both at flowering and at seed maturity. The ascaridol content of the essential oil was highest during seed ripening (68-70%). Weather conditions in 1956 had no effect on either essential oil or ascaridol formation. The most suitable times for harvest were at the beginning of flowering and at seed ripening. After early harvesting the plants regenerated readily and this made second and third cuts possible. A single late harvest is to be tried.

642. BARBIER, E. C.

Rapports entre l'évolution florale d'un lavandin et l'essence produite. (**The relationships between flower development and oil production in lavandin.**)

Avantages réciproques d'une association naturelle entre le lavandin et l'abeille. (**The mutual advantages of a natural association between lavandin and bees.**)

La pollination du lavandin. I—Ses effets sur les fleurs. (**The pollination of lavandin. I. Its effects on the flowers.**)

C.R. Acad. Agric. Fr., 1958, **44**: 616-22, bibl. 4, 623-8, bibl. 6, and 628-33, bibl. 2.

Observations described in the first paper showed that, in each flower, the quantity of essential oil was at its maximum and its refractive index at its

lowest point after the wilting of the corolla, and this suggests, therefore, that producers should cut lavandin, and perhaps lavender also, using the condition of the flowers as a guide. In the second paper it is shown that, not only does lavandin produce abundant honey of good quality, but the visits of bees cause a rapid wilting of the corolla and a perceptible increase in the yield of essential oil. The third paper shows that the wilting of the corolla is not caused simply by the bee but by the application of pollen even though the pollen may be sterile as in lavandin. The use of fertile pollen of *L. vera* had an equal but more rapid effect. An ether-alcohol extract of pollen had the same effect, and this action was not specific to the genus *Lavandula* or even to other members of the Labiatae. The presence of a hormone, which causes the wilting of the corolla, and also perhaps the increase in essential oil content, is postulated.—Lab. apicole, Nice.

643. FÉRON, M., AND GUENNELON, G.

Recherche d'éléments écologiques en vue de la lutte contre la Cécidomie des lavandes (*Thomasiniana lavandulae* Barnes). (**Studies on ecological factors in the control of the lavender gall midge.**)

Ann. Épiphyt., 1958, **9**: 11-26, bibl. 6, illus.

A study of *Thomasiniana lavandulae* on lavender has revealed the factors conducive to the spread of the pest (the climate and the age of the plantation) and the only vulnerable stage in the development of the insect, viz. the winged stage. Four dustings of a lavandin crop with DDT gave encouraging results. Further work on the control of the pest is in progress.—Centre Rech. agron. Sud-Est, Montfavet (Vaucluse).

644. CHLÁDEK, M., AND ROD, J.

Význam polyloidie ve šlechtění heřmánku pravého (*Matricaria chamomilla* L.). (**The importance of polyploidy in the breeding of *Matricaria chamomilla*.**) [Russian summary $\frac{1}{2}$ p.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 305-16, bibl. 37, illus.

Selection alone did not result in substantial plant improvement, but colchicine treatment induced polyploidy and during further work promising tetraploid plants were found. From these a strain was obtained with twice the normal azulene content in the essential oil.

Fibres.

(See also 591.)

645. PIETKIEWICZ, T. A.

Mikroflora nasion konopi. (**The microflora of hemp seed.**) [English and Russian summaries 1 p. each.]

Roczn. Nauk rol., Ser. A, 1958, **77**: 577-90, bibl. 28.

A study of 481 samples of hemp seed showed the presence of at least 14 species of fungi, as well as yeasts and some bacteria. Fungi considered potentially harmful to hemp are named. The fungi were usually found on the seed surface, and in the case of *Botrytis cinerea* and 2 *Fusarium* spp. good control was obtained by dusting the seed with thiuram and several other fungicides.

646. OLTEANU, F., AND POPOVICI, M.

Influența unui complex de factori asupra producției de cânepă. (The effect of a complex of factors on the yield of hemp.) [Russian and French summaries $\frac{3}{4}$ p. each.]

Anal. Inst. Cerc. agron., 1956 (issued 1957), 24(5): 135-46, bibl. 9.

The factors investigated separately and in combination were: sowing densities of 450 and 600 seeds per sq. m., spacings of 7.5 and 12.5 cm. between the rows and manuring at 40 kg. N and 80 kg. P_2O_5 per ha. against no manuring. Manuring had the greatest effect, giving an average yield increase of 33%; 7.5 cm. spacing raised the yield of stems by 7.5%; and 600 seeds per sq. m. gave a slightly higher yield than 450 seeds, but many plants did not mature properly and the lower seed rate is recommended.

647. KÖHLER, D.

Die Entwicklung von *Cannabis sativa* unter dem Einfluss verschiedener Tageslängen. (The growth of *Cannabis sativa* as affected by different day lengths.)

Physiol. Plant., 1958, 11: 249-59, bibl. 12, illus.

Hemp seedlings were grown for the first 2 months under long-day conditions (16 increasing to 24 hours' light) and then divided into groups which were grown in 24-, 16- and 11-hour days. Plants in continuous light failed to flower. With 11-hour days the plants flowered about a week earlier than with 16-hour days. Early in the flowering phase the female plants of these 2 groups were divided into 3 batches for 24-, 16- and 11-hour-day treatment, and the same was done for all the non-flowering continuous-day plants. The effects of treatments on leaf size and leaf shape are shown graphically. In short-day conditions the growth rate of leaves was markedly reduced during flowering, and those produced during flowering were smaller and relatively broader than their predecessors. In plants changed from short to long days at flowering, the newly formed leaves were larger, as well as broader, than the normal leaves, differing only in size from juvenile leaves. Following this "rejuvenation", whether long days were maintained or short days restored, a new growth cycle was initiated, in which relatively large, narrow leaves developed until flowering, and smaller, broader ones from flowering until the death of the plant. It was possible to induce a

second rejuvenation by short-day treatment before the second flowering and by long-day treatment during and after this. Increasing the day-length from 11 to 16 hours was as effective as increasing it from 16 to 24 hours.—Tech. Hochsch., Braunschweig.

648. EGGERS, H. W. T.

Mechanisation in *Phormium* production.

N.Z. J. Agric., 1958, 96: 43-4, illus.

Swamp *Phormium tenax* is now being replaced by plantations. Land prepared for *Phormium* is first ploughed, seeded to pasture and grazed for 2 years. Hand planting of *Phormium*, 4 ft. 6 in. apart in rows 6 ft. apart, through the grass is laborious, involving careful lining, digging holes, planting fans and replacing and treading in the turves. Planting can be greatly speeded up by the use of 3 large spade lugs mounted on the rim of a tractor wheel, which cut out the turves and deposit them ready for treading in. Hydraulically operated, tractor-mounted equipment is also now available to assist replanting in gaps where the original fans failed to grow.

649. SEALE, C. C., AND OTHERS.

Agronomy, breeding and pathology investigations of fiber crops.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 264-7, illus.

Sansevieria: Fibre leaves of *S. trifasciata* from plots limed to pH 7.2-7.5, contained more total Ca, Mg, K and Na, and less Kjeldahl N than those from unlimed plots (pH 6.0-6.1). Diploid hybrids (*S. trifasciata* $\times$ *S. deserti*) continue to show promise and appear to be superior to *S. trifasciata* in ease of propagation by leaf cuttings, rate of growth, tolerance to cold and cleaning of fibre during decortication.

650. TANGANYIKA SISAL GROWERS' ASSOCIATION (LOCK, G. W., AND OTHERS).

Annual Report of the Sisal Research Station, Mlingano, Ngomeni, for the year 1957, 1958, pp. 31, illus.

Progress is briefly reported on numerous experiments. These include: *Bulbil nurseries*: The value of sisal waste as manures or mulches, noted in the preceding report [*H.A.*, 28: 616], was again demonstrated. *Planting material and its protection*: Up to the 3rd cutting plants raised from bulbils have outyielded plants raised from suckers. In this and another trial the benefit of treating newly planted material with dieldrin or aldrin against the sisal weevil (*Scyphophorus acupunctatus*) has been clearly demonstrated. *Cultivation systems*: A trial was started in 1953 in which clean cultivation was compared with 3 cover crops, a grass (*Panicum trichocladum*) and 2 legumes (*Pueraria phaseoloides* and *Dolichos argenteus*).

Up to the end of 1957 the cover crops have depressed growth slightly in plots that received no manure, but have had little effect in plots that were well manured. *Cutting methods*: The final results of the "severity of cutting trial" after 10½ years are somewhat unexpected; the total yield of fibre per cycle has not been much affected, an increased number of leaves following heavy cutting largely offsetting the reduction in yield of fibre per leaf. In the same experiment the yield from a planting density of 6,000 plants per hectare was significantly higher than the yields from 5,000 and 4,000 plants/ha.; the difference between 4,000 and 5,000 plants was also highly significant. *Manurial trials*: Numerous trials are in progress on various soils, both fertile and exhausted, and, depending on the soil, responses have been obtained from applications of N, P, K and Ca. *Herbicide trials*: In a bulbil nursery the most effective, economic treatment was TCA or dalapon applied before the weeds emerged followed, post-emergence, by MCPA. *Plant physiology*: In a soil culture experiment involving 4 soil types failure to supply N has resulted in stunted growth in every case; deficiencies of P and K were apparent in some soils, and in one case both Mg and Ca were deficient. A sudden tip die-back following the application of potassium nitrate in a fertilizer trial is being investigated. *Spectrographic chemistry*: The trace elements in sisal leaves have been analysed spectrographically, and the average levels found in healthy leaves are indicated. There is evidence that the disease chlorotic mottle may be caused by excessive uptake of either Co or Mn.

651. SANDFORD, H.

Growing sisal in East Africa.

Span, 1958, No. 1, pp. 21-4, illus.

Ground limestone at 6 and 12 tons plus ammonium sulphate at 100 and 200 lb. N per acre caused yield increases. Sisal weevil (*Scyphophorus acupunctatus*) has been controlled by nursery spraying with ½ lb. active dieldrin per acre followed by aldrin dust in the planting holes applied as a 40% w.p. with 12½ times its own weight of diatomite at 15½ lb. of the mixture per acre. The use of herbicides, now largely experimental, is discussed.

Hops.

(See also 311t, 679q, r, t, v.)

652. WYE COLLEGE.

Annual Report Department of Hop Research for 1957, 1958, pp. 159, 5s.

A general review of research and reports on the work of the different sections is followed by 7 research papers, 6 of which are abstracted below. Included among 8 appendices there are the following review articles: Fluctuations in hop cultivation and classification of hop regions in

south-eastern England, by D. C. D. Pocock; Hops [varieties, breeding and selection] for lager brewing, by R. A. Neve; Physiological problems of hop cultivation, and Irrigation problems and the hop, both by I. H. Williams.

653. ASSOCIATION OF GROWERS OF THE NEW VARIETIES OF HOPS (A.G.N.V.H.).

Annual booklet 1958, 1958, pp. 51, illus., price to non-members 5s.

Among the articles in this booklet are: A brewing scientist looks at hops [a survey of chemical research], by A. H. Cook; The new varieties, a summary of the present position, by C. L. Jary and F. H. Beard; Progress in research on *Verticillium* wilt and virus diseases in hops in 1957, by R. V. Harris (reprinted from *A.R. E. Malling Res. Stat. for 1957*); and Techniques for hop propagation [with illustrations], by R. F. Farrar.

654. BEARD, F. H.

Some new varieties of hops in Wye field plots: a final report.

A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 60-81, bibl. 3.

The grubbing of Wye Field hop garden through progressive wilt (*Verticillium albo-atrum*) has ended a series of trials with new seedling hop varieties raised by Professor E. S. Salmon. The opportunity is taken to present the data available for 42 such seedlings. Information on all 42 varieties is summarized in tabular form in respect of parentage, yield, physical appraisal, resin analysis (P.V.), cultural details and resistance or susceptibility to disease. Eight of the varieties are considered to be of interest and are discussed in fuller detail; these are WFB26, OQ14, WFB145, WFG66, WFH65, AA70, OZ97a and XIII. The last two are tolerant to progressive wilt. [Author's summary.]

655. INSTITUTE OF BREWING, HOPS ADVISORY COMMITTEE.

Institute of Brewing hop trials: 1956 crop.

J. Inst. Brew., 1958, 64: 388-91.

The wilt-tolerant hops D1, D3 and J2 were selected for trial from the 1956 crop, and the results confirm those of previous seasons that D1 and D3 are in general acceptable as replacements for Fuggles up to at least 25% of the normal hop grist, and in many cases up to 50% replacement. On the other hand, previous results had indicated that J2 was also a hop suitable for replacement at the 25% and 50% level, but this season it was not so readily accepted even at the lower level. It was again evident that this hop has an alpha soft resin content little, if any, higher than Fuggles. OF27, a wilt-sensitive, mosaic-sensitive hop, was also included in this season's trial, but it was not wholly acceptable even at 25% replacement.

656. NEVE, R. A.

Inheritance of resin characters in hops. II. Triploid seedlings of Fuggle.*A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 43-9, bibl. 5.*

Resin contents of triploid seedlings raised from crosses between tetraploid Fuggle N and six wilt-tolerant males were determined. The mean values for the seedling families are in all cases higher than for the Fuggle parent. Most of this difference can be accounted for as a direct result of the lower seed content in the cones of the triploid plants. Smaller differences occur between families and indicate the relative value of the different male parents in transmitting resin characters. The variation within and between families is such as to suggest that genetic control of resin characters is effected by a large number of genes each producing a small effect. The importance of the results to the hop breeding programme is discussed. [Author's summary. For part I see *H.A.*, 27: 645.]

657. FARRAR, R. F.

Seed content of triploid hops: further investigations.*A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 50-9, bibl. 4.*

Triploid seedlings of Fuggle are shown to have a lower seed content than diploid Fuggle. The results of petal and seed counts are given, and show that, while triploids have a lower seed content than diploids, they have a similar number of petals. A commercial technique for rapid seed content assessment is compared with that used in earlier work on triploids, and is shown to give lower results. Samples of continental seedless hops are compared with triploids, and their seed content is shown to be lower than can be expected from the average triploid. The results are discussed in relation to the possible use of triploids as commercial varieties. [Author's summary. For earlier work see *H.A.*, 27: 647.]

658. WILLIAMS, I. H., AND WESTON, E. W.

Hop propagation. I. The germination of hop seeds.*A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 108-18, bibl. 8.*

Previous research on methods of germinating hop seeds is reviewed. Recent investigations at Wye, the results of which confirm and amplify earlier findings, are described. Low temperature treatment of presoaked seed at 4-4° C. for 5 to 6 weeks has given consistently high levels of germination and is suggested as the most suitable method where large numbers of seeds are involved. For more rapid results, the chipping of individual seeds or stratification in batches can be effective; the former method may be inconvenient when many seeds have to be treated. Chemical treatments had little

effect. Of the ten substances tested, only concentrated sulphuric acid had any appreciable success. Here the effect was probably due to physical action on the seed coat. [Authors' summary.]

659. HAUTKE, P.

Nové poznatky o pohybu živin ve chmelu. (New data on the movement of nutrients in hops.)*Chmelářství, 1958, 31: 58-60, illus.*

The function of hop roots and factors affecting their starch content are discussed [see *H.A.*, 28: 1641]. The N, P and K contents of the leaves decreased during the growing season while the Ca content increased. The fate of the individual elements during the period between harvest and cutting down the vines is being studied with particular reference to their return into the roots.

660. ASKEW, H. O., MONK, R. J., AND WATSON, J.

Molybdenum deficiency of the hop.*N.Z. J. agric. Res., 1958, 1: 553-68, bibl. 3, illus.*

A necrosis of hop leaves, eventually leading to a white speckling of the lamina, has been identified as a result of a deficiency of available soil Mo. Applications of sodium molybdate at 16 oz. per acre were very effective in overcoming the ailment. Ground limestone at 1,800 lb. per acre was also very beneficial, but not quite to the same degree as sodium molybdate. Leaves showing the symptoms contain only about 0.02 p.p.m. Mo in the dry matter of the whole lamina. Levels of other minor elements—Cu, Zn and Mn—do not appear to be related to the incidence of leaf symptoms. Improvement in health of leaves and growth of plants is correlated positively with increased Mo content of the leaves, whether that increase is brought about by use of sodium molybdate or of ground limestone. Mo content of the cones is similarly increased. There is a suggestion in the data that size of cones may be increased, and that the sugars contents of cones may be reduced, following use of sodium molybdate. [Authors' summary.]—Cawthron Inst., Nelson.

661. WESTON, E. W.

A note on the determination of the peroxidase content of hop plants.*A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 92-7, bibl. 4.*

Interest in the peroxidase content of hop cones and leaves arises from the possibility that this enzyme may promote the oxidation process by which humulone is formed from lupulone. An improved method of determining the peroxidase content is described, in which a single colorimetric measurement only is needed for each determination. In kiln-dried cones of 54 varieties a negative, but non-

significant, correlation was found between peroxidase content and the ratio % α -resin/% β -resin.

662. ASKEW, H. O., MONK, R. J., AND WATSON, J.
Physical and chemical changes in the developing hop cone.

N.Z. J. agric. Res., 1958, **1**: 757-77, bibl. 6.

Data for dry-matter contents, minerals, nitrogen (total and protein), glucose, fructose, sucrose, starch, pentosans, solids soluble in petroleum ether, and alpha-resins, covering the four seasons, 1955 to 1958, are presented for hop flowers and developing cones. Accretion of dry matter, minerals, nitrogen, pentosans, and solids soluble in petroleum ether was continuous during growth of the cone; the concentration on the dry-matter basis of Ca, Mg, K, P and N steadily decreased once the cones had been formed. Starch and sugars concentrations passed through distinct maxima, which occurred in the early stages of development of the cones to decrease to very low values at maturity. Soluble solids, alpha-resins and pentosans concentrations increased progressively with development until maturity, after which the first two constituents decreased. The amounts of starch and sugars per cone varied with development, and tended to decrease as the resins and pentosans increased. Although seasonal conditions doubtless affected the levels of given constituents at a specified stage of growth, yet the same pattern of variation in these levels during development was found in each season. [Authors' summary].—Cawthron Inst., Nelson.

663. RYBÁČEK, V.

Příspěvek k prognose technické zralosti chmele. (**Forecasting the technical maturity of hops.**) [English and Russian summaries $\frac{1}{4}$ p. each.]

Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, **31**: 239-46, bibl. 11, illus.

The author divides the growth of hops into 7 phases and as a result of phenological observations made on these phases he has developed a method of forecasting maturity. In the southern part of the Úštěk district (Sázená) with Oswald's clone No. 72 the average period between bud formation and the beginning of flowering was established as 15 days and between cone formation and the beginning of technical maturity as 20 days. In this district late pruning reduced the length of the vegetative period but had little effect on the duration of the generative period.

664. DARLING, H. S.

The use of systemic organo-phosphorus insecticides in hops with reference to the ratio of fresh to dried cones in the resulting crop.

A.R. Wye Coll. Dep. Hop Res. for 1957, 1958, pp. 98-107, bibl. 6.

The effect of systemic insecticides (schradan, dimefox and methyl demeton) in increasing the ratio of fresh to dried hops has already been reported [*H.A.*, 28: 3884], but this paper makes the additional point that the extra costs of picking and drying involved have been more than offset by improvements in yield and quality following the use of these insecticides.

665. NEUWIRTH, F., AND KOTRBA, L.

Organofosforečný zálivkový systemický insekticid "Dimefox". (**The organophosphorus systemic insecticide dimefox.**)

Chmelářství, 1958, **31**: 91-3, 106, illus.

In replicated trials watering hop plants once with (20% dimefox) at 120 c.c. of 2% solution per hill or spraying 4 times with nicotine gave very good aphid control and increased yields significantly compared with those of the controls. Dimefox was somewhat more effective than nicotine though differences in yield between the two treatments were not significant. The brewing quality of the hops treated with dimefox appeared to be slightly better than that of the controls.

666. HENDERSON, S. M.

Some hop drying studies.

Bull. Calif. agric. Exp. Stat. **762**, 1958, pp. 28, bibl. 2, illus.

This bulletin summarizes investigations carried out over 4 seasons in commercial kilns and in a pilot drying cabinet. It is directed especially towards those doing research into engineering design, but also contains material of interest to operators of hop kilns. Among the points to emerge are: 1. Electrical conductivity-type meters appear to provide a rapid means of determining moisture contents at the end of the drying period. 2. An equilibrium moisture-content curve and basic drying rates were established for hops. 3. At low relative humidities hops may "case harden", hence the basic drying rate is slow. 4. In determining quality the opinion of an individual judge proved of more significance than the weighted average of a number of finite factors. 5. Samples dried at 110°-115° F. were judged superior to samples dried at higher temperatures. 6. Partial drying with air at 150° F. followed by final drying with unheated air at a moderate rate of air flow produced a product of good quality; this procedure might be used to increase kiln capacities. 7. An air-flow rate of 80-85 cu. ft. per min. per sq. ft. lifted 34-in.-deep hop masses when these were dry; 60 cu. ft. per min. per sq. ft. is believed to be the highest practical air rate for a 34-in. hop mass. 8. Information was also obtained on the effects of reversing the direction of air flow, of closed re-circulation of air and of handling the hops following drying on variations in moisture content throughout the mass.

Insecticidal plants.

667. HASHAD, M. N., KHALIFA, A., AND MAHMOUD, S. M.

A study on the effect of some environmental factors on the toxic substance in pyrethrum. [Arabic summary $\frac{1}{2}$ p.]

Ann. agric. Sci. Cairo, 1956, 1(2): 65-79, bibl. 8, [received 1958].

The results of 3 experiments using pot-grown pyrethrums are given. (1) In a study of pyrethrums grown in loamy, sandy, mixed or calcareous soils it was found that plants grown in calcareous soil gave the highest yield of flowers in the first year, but in the second year, or if both crops were combined, the highest yield was obtained from the plants in the loamy soil. The lowest yields were from plants in the sandy soil. The fresh weight, period of maturity and the pyrethrins content of the flowers were not affected by the soil type, but in all cases flowers with a higher pyrethrins content were produced in the second year. (2) In an experiment in which various rates of lime were added to the soil there was no significant variation in the number of flowers borne on the plants in the first year, but in the second year the increase in the number of flowers was directly proportional to the amount of lime added. On the other hand, the heaviest flowers were produced on the plants receiving no lime. The pyrethrins content of the flowers did not vary significantly between treatments. (3) When plants were watered every 3, 6, 12 or 18 days, the highest yield of flowers occurred with watering at 6-day intervals, the weight of flowers decreased during drought, but the maturity and pyrethrins content of the flowers were unaffected by frequency of watering. The flowering season was extended when the plants were watered every 3 or 6 days.—Univ. of Shams, Cairo. J.R.L.

Rubber plants.

(See also 679p.)

668. ŠUHOBOFSKIJ, B. A.
***Euonymus sieboldiana* and its gutta percha content.** [Russian.]
Bot. Žurnal, 1958, 43: 889-95, bibl. 5, illus.
In the U.S.S.R. *E. sieboldiana* occurs in the south of Sakhalin. The gutta-percha content of the root-bark of 11- to 50-year-old plants averaged 4% of dry weight (resin 2.8 and gutta 6.6%). In the stem-bark the gutta percha content was considerably lower. The seed of this species contains about 40% of a non-drying oil.

669. CHILOV, E. A., AND OTHERS.
Les produits intermédiaires de biosynthèse du caoutchouc et du carotène dans le kok-saghyz. (Intermediary products of rubber and carotene biosynthesis in kok-saghyz.) [English summary 19 lines.]
Rev. gén. Caoutch., 1958, 35: 1067-72, bibl. 11, illus.

The authors introduced various organic compounds containing C^{14} into kok-saghyz and measured the radioactivity of the rubber and other substances from the treated material. It was shown that the greatest amount of radioactivity was conferred by alanine tagged in position 2 or 3 (not in position 1). It is suggested that this amino acid may be the precursor of rubber. In the case of carotene, the same role is played by acetic acid and alanine. Alanine loses some CO_2 during incorporation into carotene or rubber. Conversely, β -methylcrotonic acid and isoprene transmitted little radioactivity to rubber or carotene, and should not be considered as precursors. The probable mechanism of rubber and carotene formation in plants is discussed.—Acad. Sci. Ukraine, Kiev.

Seed oils.

(See also 679n.)

670. CHISHOLM, M. J., AND HOPKINS, C. Y.
Fatty acids of the seed oil of *Cardiospermum halicacabum*.

Canad. J. Chem., 1958, 36: 1537-40, bibl. 7.
Seeds of the temperate sapindaceous species *Cardiospermum halicacabum* averaged 0.074 g. in weight, were easily ground and yielded 28% oil on a 10% moisture basis. A unique feature of this oil was the presence of eicosenoic acid as the major fatty acid in its glycerides. Another unusual feature was the presence of an appreciable amount of linolenic acid despite an iodine value well below 100. The estimated percentages of the main fatty acids were: palmitic 3, linolenic 8, linoleic 8, oleic 22, stearic 2, eicosenoic 42, and arachidic 10.—Nat. Res. Coun., Ottawa.

671. CUSHING, E. C., AND CIRINO, V. O.
Composition of the seed and oil of *Cnidoscolus texanus*.

J. Amer. Oil Chem. Soc., 1957, 34: 611, from *Publ. Pat. south. Utiliz. Res. Develop. Div.*, July-Dec., 1957, 1958, Abstr. 38.

Analysis of early and late maturing seed from *C. texanus* indicates that the seeds are rich in both oil and protein. The hulls contained relatively large amounts of crude fibre and nitrogen-free extract. The oil is a nondrying oil somewhat higher in saturated acids than cottonseed oil. It apparently does not contain glycerides, having acids more unsaturated than linoleic acid. The composition of both seed and oil is similar to that reported for the closely related species, *Jatropha stimulosa*.

672. GAMO, L. G., AND CRUZ, A. O.
Composition of the pulp and seed oil of *kamachile* (*Pithecolobium dulce*).
Philipp. J. Sci., 1957 (issued 1958), 86: 131-4, bibl. 9.

The oil resembles groundnut and kapok seed oils and could be used for similar purposes. Fresh pods were found to consist of 50.3% pulp, 25.3% seeds and 24.4% peelings. The seeds, when dried, contained 18.3% oil and 24.1% protein.

673. THOMAS, C. A.

Effect of temperature on control of seed-borne teliospores of safflower rust with a volatile mercury fungicide.

Abstr. in *Phytopathology*, 1958, 48: 398.

Safflower seed heavily infested artificially with teliospores of *Puccinia carthami* and slurry-treated with Panogen 15 (2.2% cyano (methylmercuri) guanidine) at dosages of 1-4 oz./bushel was held 3 days in sealed storage at 5, 10, 15, 20, 25, 30 and 40° C. Treated seeds were planted in flats of moist, steamed soil, which were held 1 week at 5° C. in a cold room and 4 weeks at 20° C. in the greenhouse. Plants from infested but untreated seed were 100% rusted. The number of rusted seedlings produced from treated seed decreased as either storage temperature or dosage was increased. Maximum percentages (1-5%) of rusted seedlings were produced at storage temperatures of 5-15°. Less than 0.5% rusted seedlings developed from seed treated at 2-4 oz./bushel and stored-at 25-40°. None of the treatments gave perfect control, affected stand, or produced visible injury.

674. GENTRY, H. S.

The natural history of jojoba (*Simmondsia chinensis*) and its cultural aspects.

Econ. Bot., 1958, 12: 261-95, bibl. 13, illus. DAUGHERTY, P. M., SINEATH, H. H., AND WASTLER, T. A.

Industrial raw materials of plant origin. IV. A survey of *Simmondsia chinensis* (jojoba).

Bull. Ga Engng Exp. Stat. 17, 1953, summarized with supplementary notes on utilization and references in *Econ. Bot.*, 1958, 12: 296-306, bibl. 90, illus.

This desert shrub is endemic to the Californian Gulf region and its large edible seeds contain about 50% of oil, chemically a liquid wax with qualities that should make it of value for many industrial and medicinal purposes. This paper describes the morphology and distribution of wild jojoba, the variable characteristics of the plant, the yields obtained and the early results of trials on its propagation and development as a cultivated crop. The second paper gives the physical and chemical properties of jojoba oil, describes the various products that can be produced from it, and discusses the economic potentialities of the plant.

Tannin plants.

See 679e, g.

Sundry plants.

(See also 679d, h-j, s, w.)

675. GEBAUER, H.

Vitamine und Pflanzen. (Vitamins and plants.) [French and English summaries 6 lines each.]

Qual. Plant. Maveg., 1958, 3/4: 161-5.

Pasteurization (75° C. for 20 min.) and heating at 115° C. for 5 min., each resulted in heavy loss (about 90%) of vitamin C during storage of sea-buckthorn berry juice, but ultraviolet or infra-red treatment gave much more satisfactory results, although after 4 months the content in treated juice was little more than half that in natural juice. Vitamin C contents are quoted for fresh sea-buckthorn berries, syrup made from them, capsicum, mountain ash and service-tree fruits. The ratio of dehydroascorbic to ascorbic acid was generally markedly higher in seeds than in green plant organs and fruits, but this did not apply to lettuce, tomato or fennel. In a sample of commercial tea, 200 c.c. of the beverage contained as much as 40 mg. of vitamin C.—Inst. Ernähr. dtsh. Akad. Wissensch., Potsdam-Rehbrücke.

676. HADFIELD, W.

The raising of bamboo from seed.

Two and a Bud, 1958, 5(2): 9-10.

As they are likely to be damaged by rodents, insects and fungi, bamboo seeds should be collected by shaking on to sheets and not from the ground. They are treated with insecticides and dried before sowing in shaded nurseries in drills 12 in. apart and 4-6 in. apart in the drill. Germination takes 2-6 weeks, and the seedlings may be transplanted to the field 12-18 months after sowing. The large seeds of *Melocanna bambusoides* should be spaced at 12-15 in.

677. YOUNG, E. G., AND GORING, D. A. I.

The stability of carrageenin in dried Irish moss (*Chondrus crispus*).

J. Sci. Food Agric., 1958, 9: 539-41, bibl. 9.

It was shown previously that sodium carrageenate the polysaccharide sulphate of the red alga *Chondrus crispus*, undergoes degradation when stored as a dry powder under certain conditions. It has also been generally believed that some degradation of carrageenin occurs in the seaweed, when this is dried and stored for a year or more. In the experiment described here a large batch of the seaweed was dried to about 10% moisture and kept for 2 years at 4°, 10° and 20° C. At all temperatures there was a loss in gel strength of the carrageenin present after 1 year, and at 20° there was also a loss in viscosity. These losses became more pronounced after 2 years, and at this stage a slight loss of sulphate was also detected in batches stored at 10° and 20°.—Atlantic reg. Lab., Nat. Res. Coun., Halifax, N.S.

578. WILLITS, C. O.
Maple-sirup producers' manual.
Agric. Handb. U.S. Dep. Agric. **134**, 1958,
pp. 80, bibl. 129, illus., 60 cents.
This manual covers the whole story from A to Z,
and to be more precise, it deals with production
and economic aspects in the United States, species
of sugar maple, maple groves and their yields,
tapping and collecting the sap, evaporators and
their operation, the composition and quality of
maple syrup, the numerous processes and test
to which the syrup is subjected, and many tooth-
some products that are made from it. There are
photographs as well as line drawings and maps.
- Noted.*
579. BARUA, A. K., CHAKRAVARTI, D., AND
CHAKRAVARTI, R. N.
**Steroid sapogenins from Indian *Dioscorea*
plants. II.**
J. Indian chem. Soc., 1956, **33**: 798-803,
from *Biol. Abstr.*, Sect. D, 1958, **32**, Abstr.
24,695.
Among 11 *Dioscorea* spp. examined *D.*
deltoidea yielded 3-35% diosgenin.
- BRINER, G. P.
**Determination of strychnine in nux vomica
by paper chromatography.**
Nature, 1958, **182**: 742, bibl. 3.
- CHOPRA, R. N., CHOPRA, I. C., AND HANDA,
K. L.
**Utilization of Indian medicinal and allied
plants—a review.**
Sci. and Cult., 1958, **24**: 59-64, 112-16,
bibl. 54.
Includes short notes on numerous plants and
attempts made to grow them on a large
scale.
- GREENE, M. T., AND MARVIN, J. W.
**The water content of maple stems. II.
Apparent changes in the water content of
maple stems and the physiology of maple
sap flow.**
Plant Physiol., 1958, **33**: 173-6, bibl. 7.
- HATHWAY, D. E., AND SEAKINS, J. W. T.
Cell-wall polysaccharides of myrobalans.
Biochem. J., 1958, **70**: 155-8, bibl. 28.
The dried fruits of *Terminalia chebula*, which
contain 43-53% of tannin.
- HILLIS, W. E.
Formation of condensed tannins in plants.
Nature, 1958, **182**: 1371, bibl. 14.
From leuco-anthocyanins with or without
catechins, etc.
- g HILLIS, W. E., AND URBACH, G.
**Leuco-anthocyanins as the possible pre-
cursors of tannins.**
Nature, 1958, **182**: 657-8, bibl. 12.
From wattle bark and other tannin sources.
- h LEVIN, H. J.
**A phytochemical study of the nonvolatile
constituents of *Amphiachyris dracunuloides*
(DC) Nutt., Compositae.**
Diss. Abstr., 1958, **19**: 236-7, being *L.C. Card*
No. Mic. 58-2635 of 102 pp.
Particularly flavonoids, which may be the
principles active against colds.
- i NIKAM, B. G., AND MAHADIK, C. N.
Delicate *Pan* needs specialized care.
Indian Fmg, 1958, **8**(4): 8-11, illus.
Advice on growing *Piper betle* and the
economics of the crop.
- j NIKAM, B. G., MAHADIK, C. N., AND
RATHORE, V. S.
***Pan* crop pests and diseases shouldn't be left
alone.**
Indian Fmg, 1958, **8**(5): 11-13, illus.
Control measures for betel leaf disorders.
- k OZOUX, M.
Le géranium rosat à l'île de la Réunion.
(The rose geranium in Réunion.)
Rev. agric. Réunion, 1958, **58**: 52-6.
Cultivation and harvesting of *Pelargonium*
roseum and oil distillation.
- l PILLAY, P. P., AND IYER, K. M.
**A chemical examination of *Embblica officinalis*,
Gaertn.**
Curr. Sci., 1958, **27**: 266-7, bibl. 8.
Organic acids and a phenolic substance in
the fruit, which is used as a drug.
- m RAGHAVAN, R. S., AND ARORA, C. M.
**Chromosome numbers in Indian medicinal
plants—II.**
Proc. Indian Acad. Sci., Sect. B, 1958, **47**:
352-8, bibl. 13, illus.
31 species, 15 for first time and 5 earlier
observations revised.
- n RAO, B. Y.
Literature review on oils and fats, 1956.
[*Publ.*] *C.S.I.R., New Delhi*, 1958, pp. 74,
bibls.
Reviews and bibliographies on all aspects of
production and utilization.
- o RAUTOU, S., AND COGNOT, J.
Essais de variétés-hybrides de ricin dans la
région méridionale. (Trials of hybrid
varieties of castor oil in southern France.)
C.R. Acad. Agric. Fr., 1958, **44**: 643-7.
Three years' trials of F₁ hybrids at Mont-
pellier; economic future doubtful.

- p ROYÓ, J., FUERTES, J., AND DE RAFOLS, W. Estudios tecnológicos sobre caucho de *Taraxacum kok-saghyz*. (Technological studies on the rubber from *Taraxacum kok-saghyz*.) *An. Inst. nac. Invest. agron. Madrid*, 1957, 6: 389-403, bibl. 3, illus. Physical characteristics.
- q ROYSTON, R., HOLMES, I., AND PARK, E. L. Hops by states, 1915-56; revised estimates. *Statist. Bull. U.S. Dep. Agric.*, 225, 1958, pp. 8. Acreage, yield, production, disposition, value and stocks in the U.S.A.
- r SACHL, J., AND FIDRMUC, L. Šáma a její využití ve chmelnicích. (Pit lime and its use in hop gardens.) *Chmelařství*, 1958, 31: 140, illus. Waste lime from sugar factories used at 10 tons/ha. results in unbalanced nutrition.
- s SIRAJ-UD-DIN. Cultivation of henna in gardens. *Punjab Fruit J.*, 1957, 21(77): 17-18. Brief notes on culture, uses and composition of *Lawsonia alba*.
- t STRACH, L., AND SRBEK, A. Někteřé poznatky z sušáren chmele. (Some results of hop kiln operations.) *Chmelařství*, 1958, 31: 101-3, illus. The performance of 9 kilns tabulated and discussed.
- u TYLER, V. E., JR. Occurrence of serotonin in a hallucinogenic mushroom. *Science*, 1958, 128: 718, bibl. 8. In the toxic mushroom, *Panaeolus campanulatus*.
- v VENT, L. Československé chmelařství. (Hop cultivation in Czechoslovakia.) [English, French and German summaries.] *Chmelařství*, 1958, 31: 114-17, illus. Concentrated in 3 areas of which Žatec is the most important.
- w WAGNER, J. G. A phytochemical investigation of the fruit of *Maclura pomifera* (Rafinesque) Schneider. *Diss. Abstr.*, 1958, 18: 817-20, bibl. 12, illus., being L.C. Card No. Mic. 58-748 of 147 pp.

FLORICULTURE.

General.

(See also 24, 46, 48, 60, 69, 71n, 311a, 773d, e, l, m, 774k, m, 968, 1001.)

680. THAYER, C. L., AND OTHERS.

Department of Floriculture.

A.R. Mass. agric. Exp. Stat. 1955-1956, 1957, pp. 39-41.

Work is reported on the following: *Roses*: Application of a chelating agent, Na₃EDTA, before planting caused mild injury at 4 oz./100 sq. ft. and severe injury at 20 oz., whereas no injury was apparent at a 0.8 oz. rate or with NaFeEDTA applied at 4½ oz./100 sq. ft.; at non-toxic levels of Na₃EDTA or NaFeEDTA flower production was increased by 1-2 flowers per plant over controls. Water absorption, transpiration and the life of cut roses and carnations were markedly reduced after stem tissues had been injured by water temperatures maintained above 85° F. *Carnations*: Symptoms of abnormal flower bud development were corrected by B applications; in sand cultures optimum growth occurred at B concentrations ranging from 0.1 to 5 p.p.m.; no B deficiency symptoms were observed after 14 months in plots treated regularly either with a soluble 12-12-12 fertilizer containing trace elements or with 2 different fritted trace element mixtures applied at 50 and 100 lb. per acre, whereas deficiency symptoms appeared on control plants 11 months after planting; the percentage of calyx splitting was

2-3 times greater among deficient plants than among normal plants. Low and high applications of DTPA chelated iron increased production of carnation flowers by 8% and 14%, but calyx-splitting increased by 11% and 52%. Production and the timing pattern were not affected by lighting carnations intermittently during the night, but quality, as measured by weight, thinner stems and longer internodes, was decreased. *Chrysanthemums*: Urea-formaldehyde fertilizers proved a satisfactory source of N for potted chrysanthemums, and their effectiveness was not decreased in sterilized soil. A spray of 400 p.p.m. MH was an effective substitute for manual pinching to break apical dominance in potted chrysanthemums. *Snapdragons*: Plants with 4-8 leaves were most sensitive to increased daylength; increased daylength reduced height, weight and the time taken to flower. *Anemone coronaria*: Plants grown at cool night temperature (50-55° F.) produced twice as many flowers of higher quality as plants grown at 60-65° F. night temperature. Plants receiving 8-hours daylight produced less than half as many flowers as those receiving 4 extra hours of daylight.

681. ZIMMERMAN, R. A.

Progress made at Rutgers in ornamental research program.

Flor. Exch., 1958, 131(10): 27-9.

The application of fertilizer to cuttings of privet

and *Taxus cuspidata* during rooting resulted in the formation of better root systems. Other studies in progress on shrubs, which concern nutrient deficiencies, optimum levels of N and K, and N source and application, are briefly mentioned.

682. SHANKS, J. B.

Mist propagation saves labor, produces more uniform results.

Flor. Exch., 1958, 131(10): 15, 19.

Experience with low pressure mist.

Grower, 1958, 50: 671, 673.

Recommendations, based on experience at Maryland University, are made on the use of intermittent mist for the rooting of cuttings, raising seedlings and open bench grafting. Good results are reported in the rooting of chrysanthemums, roses, carnations, azaleas, geraniums, hydrangeas, geranias and poinsettias. Rooting cuttings in soil or clay or peat pots was found to save labour and to prevent a check at transplanting.

683. SHEPHERD, F.W.

Plant propagation.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 56-60, bibl. 2.

The propagation units used were frames with double lights in the open or in a propagating house and a greenhouse bench with intermittent mist; the media were vermiculite, coarse sand, peat or a mixture of peat and sand. *Pittosporum tenuifolium* cuttings were taken in January or July-September. Just over 50% rooted under mist, nearly 25% in the outdoor frames and 10-15% in indoor frames. The best rooting medium was 3:3:1 mixture of sand and peat. Vermiculite was less satisfactory under mist than elsewhere. The best treatment, giving 70% rooting, was mist propagation of cuttings taken in late August. Air layering showed promise. *Vaccinium corymbosum* hardwood cuttings, inserted under mist in March, produced 25% rooted plants by mid-June, while softwood cuttings inserted under mist in July produced 52% rooted plants by the end of the year. The bamboo *Arundinaria japonica* has proved promising as a shelter plant. It has been successfully propagated by burying 1- or 2-year-old stems, with or without roots, in trenches 6 in. deep in May.

684. DICKEY, R. D., AND SHEEHAN, T. J.

Effect of perlite, mixtures of perlite and peat, and methods of watering on rooting of cuttings.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 119-20.

The effects of 3 methods of watering and 6 rooting media were studied with cuttings of *Viburnum spensum*, *Ligustrum japonicum*, *Rhododendron*

indicum, *Podocarpus macrophyllus* *maki*, *Camellia japonica*, *Thryallis glauca*, *Ilex opaca* and *Feijoa sellowiana*. Rooting was equally good under interrupted and constant mist, and was better than with hand watering. Mixtures of perlite and peat and peat alone were better than perlite alone as rooting media.

685. RUPPRECHT, H.

Ein Beitrag zur Wuchsstoffanwendung bei der Stecklingsvermehrung von Chrysanthemen, Myrten und Nelken. (The application of growth substances in the propagation by cuttings of chrysanthemums, myrtles and carnations.) [Russian and English summaries $\frac{1}{2}$ p. each.]

Arch. Gartenb., 1958, 6: 150-64, illus.

A proprietary growth substance in powder form, P604, was used in investigations on the propagation of cuttings of several ornamentals. In assessing the results a distinction was made between the two phases of rooting, namely the formation of the roots and their further development. Success depended on establishing harmonious relationships between the moisture content of the rooting medium and temperature and light. With chrysanthemums and myrtles the differences between treated and untreated cuttings became greater as the moisture content of the medium was reduced and the air temperature and light intensity were increased. These effects were independent of season, method of watering and medium. In the case of carnation cuttings taken in August/September a good initial response was apparent 42 days after the application of P604 to cuttings kept at the highest air temperature of 25.6° C., but with cuttings kept at lower temperatures (22.4° and 14.3° C.) the effect was negligible or deleterious. At all three temperatures, however, the treatment was detrimental to the further development of the roots.—Inst. ZierpflBau, Humboldt Univ., Berlin.

686. GRAY, R. A.

The anti-auxin effect of gibberellic acid in the rooting of cuttings.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xL.

In a rooting powder mixture containing 10 parts GA to 1 part IBA, the stimulatory effect of IBA on rooting was counteracted in saintpaulia leaf cuttings and in hibiscus stem cuttings. On the other hand root formation by coleus cuttings was increased by treatment with 50 parts GA to 1 part IBA. When applied to the lower parts of the stems of intact bean and tomato plants, GA (1%) in lanolin paste did not counteract the root initiating effect of IAA (0.1%) but appeared to enhance it.—Merck and Co. Inc., Rahway, N.J.

687. TAYLOR, J. L., AND WIDMOYER, F. B.
Forcing and growth of ornamental plants in containers.

Quart. Bull. Mich. agric. Exp. Stat., 1958, 41: 130-5, bibl. 6, illus.

In order to spread nursery labour better throughout the year work was carried out to determine whether it would be possible to extend the spring and autumn planting seasons and to stimulate the winter and summer sales of pot plants. By using suitable methods, *Spiraea bumalda* "Anthony Waterer", *Philadelphus virginialis*, *Syringa vulgaris*, *Picea glauca densata* and *Pinus sylvestris* were all successfully transplanted in July. The flowering species were also grown successfully in 8-in. plastic pots and marketed when in flower. Eight out of 9 species of shrubs and herbaceous perennials were successfully forced in a greenhouse (65° night temperature) and marketed for Mother's Day and Easter. *Picea* and *Pinus* plants, 18 and 24 in. high, were marketed in 8-in. pots as Christmas trees.

J.R.L.

688. HILLER, W.

Die praktische Anwendung von synthetischen Polyelektrolyten und ihre Wirkung auf die Struktur von Erden und den Ertrag im Gartenbau. (Practical application of synthetic polyelectrolytes and their effect on soil structure and yield in horticulture.)

Dtsch. Gartenb., 1958, 5: 186-7.

Mixture of a proprietary soil conditioner with potting composts had little effect on the growth of cyclamen, chrysanthemum and *Asparagus sprengeri*, and did not prevent soil compaction by watering.—Inst. ZierpflBau, Berlin.

689. BIK, R. A.

Die Bedeutung von Eisenchelaten für den Zierpflanzenbau. (The significance of iron chelates for ornamental plants.)

Gartenwelt, 1958, 58: 255-6, illus.

The application of 3 chelate compounds (at 0.5%) to pots of hydrangea, cineraria, *Primula obconica*, begonia and gardenia corrected Fe chlorosis in 3-4 weeks. Plants in flower were slower to react than young plants. The application of 0.5 g. Chel330Fe per plant of *Lilium auratum* corrected chlorosis within 3 weeks. Chlorosis in glasshouse roses disappeared following treatment with 2.5 g. Fe chelate per plant applied after pruning but before heating was started. For outdoor roses applications of 5-10 g. per plant are recommended.—Proefst. Bloem., Aalsmeer.

690. DOWNS, R. J., BORTHWICK, H. A., AND PIRINGER, A. A.

Comparison of incandescent and fluorescent lamps for lengthening photoperiods.

Proc. Amer. Soc. hort. Sci., 1958, 71: 568-78, bibl. 16.

The effects of incandescent and fluorescent supplementary lighting were studied with various test plants, which included tomato, dill, catalpa, red maple, *Hibiscus syriacus* and 2 *Pinus* species. Plants of Marglobe tomato, red maple, catalpa, hibiscus and pine grew taller under incandescent light than under fluorescent light. Dill plants, in which stem elongation is an integral part of the flowering process, flowered sooner under incandescent than under fluorescent supplementary light. Accelerated stem elongation caused by incandescent supplementary light is due to the far-red component of the radiation emitted.—U.S.D.A., Beltsville, Md.

691. WHANG, H. A., AND OTHERS.

Effect of humidity on growth of selected ornamental plants.

Quart. Bull. Mich. agric. Exp. Stat., 1958, 41: 139-43, bibl. 3, illus.

Plants of the broad-leaved species *Cissus rhombifolia*, *Dracaena godseffiana*, *Peperomia obtusifolia variegata* and *Scindapsus aureus* and the hardy conifers *Juniperus chinensis*, *Pinus nigra*, *Taxus cuspidata andersoni*, *T. c. capitata* and *T. media hicksi* were grown for 5 months in atmospheres of high and low relative humidity. It was found that plants grown at 74.6° F. and 34.4% R.H. required 4 times as much water, and even then did not produce as many, as large or as dark green leaves, as those grown at 77.2° F. and 91.9% R.H. The smaller leaves of the low-humidity plants had more closely compacted cells, containing more and smaller chloroplasts. The conifers tested showed no relationship between plant weight and humidity, but with the broad-leaved plants linear growth and fresh and dry weights were all superior, with one exception, in the plants from the high humidity chamber. The exception was *D. godseffiana*, which grew as well or slightly better under conditions of low relative humidity. J.R.L.

692. KUITERT, L. C., AND KERR, S. H.

Control of insect and arachnid pests of woody ornamentals.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 87-8

In phytotoxicity tests no injury to *Ixora coccinea*, *Ardisia crispa*, *Feijoa sellowiana*, *Buxus microphylla*, *Polyscias balfouriana*, *Neanthe bella*, *Sansevieria zeylanica* and several orchid species was observed following the application of soil drenches of Nemagon, V-C 13, parathion or demeton and of foliar sprays of demeton, Chlorobenzilate, Kelthane, Oxev, Genite 923, Aramite, Trithion and Mitex. In a rose trial in 4 soil types, treatment with Nemagon, parathion and V-C 13 increased flower production over control plots, the increase being most marked and consistent in the V-C 13 plots. Insecticides (parathion or malathion wettable powder plus Staley sauce bait, and dieldrin and heptachlor granules) applied for Mediterranean

fruit fly control were not phytotoxic to any of a large number of trees and shrubs.

593. NEISWANDER, R. B.

The distribution and control of bagworms in Ohio.

J. econ. Ent., 1958, **51**: 367-8, bibl. 4.

Ohio arborvitae and juniper are particularly subject to injury by *Thyridopterix ephemeraeformis*. For many years an arsenical spray applied when the larvae are small has been recommended for the control of this insect. Because home owners fail to observe the small bagworms, newer materials were tested against the insect in more advanced stages. Dieldrin appeared more effective than lead arsenate, and malathion killed most of the full grown larvae even though they had stopped feeding. [From author's abstract.]

Annual and herbaceous plants.

(See also 773a, f, j, u, x, 774c, f, h, l, n.)

594. PETERSEN, L. J., AND BAKER, R.

Dips and drenches for the control of *Fusarium* stem rot of carnations.

Abstr. in *Phytopathology*, 1958, **48**: 397.

The conidia of *Fusarium roseum* f. *cerealis* (causal agent of fusarium stem rot) were found on carnation cuttings used in propagation. Infested cuttings were dipped for 10 min. in various solutions and suspensions of fungicides in attempts to eradicate this inoculum. Results indicated that Pandrench 4 (3.0 p.p.m. cyano (methylmercuri)onidine), Panogen experimental material No. 449 (3.0 p.p.m. active ingredient), and ferbam (0.000 p.p.m. ferric dimethyldithiocarbamate) were effective in control. In a representative test 27 of 100 plants were dead in the inoculated control 60 days after the propagative period, whereas 0, 2, and 1 plants were dead in plots in which cuttings had been dipped originally in Pandrench 4, Panogen 4, 13849, and ferbam, respectively. At the same time these compounds were equally effective when applied as drenches at the beginning of the propagative period. Combination dips and drenches were slightly phytotoxic, but gave better control than dips or drench treatments alone.

595. SAMPSON, D. R., AND OTHERS.

Investigations on the sporting process in greenhouse chrysanthemums.

Canad. J. Plant Sci., 1958, **38**: 346-56, bibl. 8, illus.

The chromosome numbers of 56 varieties of greenhouse chrysanthemums were determined. Sporting, mostly flower colour mutation, was accompanied by the gain or loss of a few chromosomes in about 2% of the cases. The most frequent chromosome number in the authors' material was $2n=57$. The range was $2n=45-64$. Attempts to induce sporting by hot-water treatment failed. Varieties with large

inflorescences had higher chromosome numbers ($2n=58-64$) than varieties with medium or small inflorescences ($2n=54-58$), but in most of the material varieties with small inflorescences differed little in chromosome number from those with medium-sized inflorescences. [From authors' abstract.]—Hort. Div., exp. Fms Serv., Ottawa.

696. MAATSCH, R., AND HANTELMAAN, R.

Gesteuerte Chrysanthemenkultur I-V. (Controlled chrysanthemum growing. Parts I-V.)

Gartenwelt, 1957, **57**: 33-5, 197-9, 239-40, and 1958, **58**: 256-8, 277-8, all illus.

The results of extensive studies at the Institut für Zierpflanzenbau (Hanover) are discussed. Tables show the effects of time of planting and of stopping on the time of flowering and on flower quality of many chrysanthemum varieties grown as pot plants or for cutting. [Part III was previously abstracted in *H.A.*, 28: 682.]

697. WEBSTER, A. B.

Planting density and the economics of late flowering chrysanthemum production.

Reprint from *J. agric. Econ.*, 1958, pp. 53-66.

Experiments carried out over three years with a large number of plants at Auchincruive showed that while the density of late flowering chrysanthemums for maximum yield was always 21 lifters [plants grown in open ground during the summer and transplanted into a glasshouse border in the autumn for flowering] or 9 pots [plants grown throughout in $8\frac{1}{2}$ in. pots] per square yard of plot, the density for maximum profit and the size of the profit varied inversely with production costs up to the time of housing and directly with the selling price and the crop potential (the number of potential disbudded blooms on the plant at housing time) of the plants. Tables and formulae are given for deriving this density and for assuring the grower of the maximum possible profit despite lower selling prices than expected. [Author's summary. See also *H.A.*, 28: 2869.]—W. Scot. agric. Coll.

698. YASUDA, I., AND KOREMATSU, H.

The culture of chrysanthemums illuminated by fluorescent lamps. I. Effects of light intensity under lamps of various watts. [Japanese, with English summary $\frac{1}{2}$ p.]

Sci. Rep. Fac. Agric. Okayama Univ., 1958, No. 11, pp. 69-77, bibl. 3.

Experiments showed that 10 and 60 w. fluorescent lamps and 40 and 200 w. incandescent lamps all effectively prevented flower bud differentiation in the late-flowering chrysanthemum varieties Kanbotan and Unzen. Flower bud differentiation began 10-15 days after the lighting was discontinued and by the 20th day had occurred in all the plants. Differences were found in the length of flowering stems but these could not be attributed to the type of lighting. J.R.L.

699. HARADA, H., AND NITSCH, J. P.

Changes in endogenous auxins during flower development.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): iv.

Progressive changes in the auxin pattern were found in the tips of a short-day plant, *Chrysanthemum morifolium* var. Shasta, during flower development, but a strong neutral inhibitor was present at all stages. At least 4 auxins were separated chromatographically. In the growing tips of the long-day *Rudbeckia speciosa* 2 auxins increased greatly in amount during the long-day inductive treatment. A third, new auxin became visible 3 weeks after the start of long-day treatment, when the plants began to bolt.—Cornell Univ., Ithaca, N.Y.

700. TEAS, H. J., AND HOWE, K. J.

Effects of gibberellins on some flowering plants.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 69-71, illus.

Chrysanthemums treated with GA during long-day conditions showed growth increases of up to 122% over control plants. Similar responses were shown by plants treated in the first week of short-days. Plants which were treated with GA after more than a week of short-days showed variation in growth elongation. Stocks did not respond to tip applications of 0.1 to 5.0 μ g. repeated 3 times at weekly intervals. Nasturtiums flowered 10 days earlier after the seed was soaked for 24 or 48 hours in a 100 p.p.m. solution.

701. CATHEY, H. M., AND STUART, N. W.

Growth and flowering of *Chrysanthemum morifolium* Ramat. as affected by time of application of gibberellic acid.

Proc. Amer. Soc. hort. Sci., 1958, 71: 547-54, bibl. 5, illus.

The application of GA during long and short photoperiods increased stem length in 2 varieties and flower diameter in 1 variety. In plants grown in long days only stem elongation was increased relative to the concentration of GA used. In plants subjected to short photoperiods the period of greatest sensitivity to GA in a 10-week variety occurred in the third week. Peak sensitivity for peduncle elongation occurred in the fourth week after the start of short photoperiods. Applications of high GA concentrations in the seventh week of short photoperiods hastened floret development. [See also *H.A.*, 28: 2876.]—U.S.D.A., Beltsville, Md.

702. CATHEY, H. M.

Mutual antagonism of growth control of *Chrysanthemum morifolium* by gibberellin and Amo-1618.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): XLIII.

Gibberellin induced maximum elongation of chrysanthemum plants when applied in the third

week of short photoperiods; Amo-1618 induced maximum suppression of growth when applied during long photoperiods or during the first 2 weeks of short photoperiods. Gibberellin and Amo-1618 were mutually antagonistic when applied as foliar sprays to the apical meristems in the proportion 1 part gibberellin to 10 parts Amo-1618 (weight basis) at the start of short photoperiods.—U.S.D.A., Beltsville, Md.

703. WIDMER, R. E.

The determination of cold resistance in the garden chrysanthemum and its relation to winter survival.

Proc. Amer. Soc. hort. Sci., 1958, 71: 537-46, bibl. 5.

A test, in which field-grown plants were placed first at 6° C. and the temperature was then lowered by 3° C. each week until the minimum of -21° C. was reached, gave a better indication of the cold resistance of chrysanthemums than a test, in which plants were hardened at 2° C., followed by low temperature exposure for a week. In general, a limited amount of plant injury occurred in plants exposed to -9° C., whereas injury was severe in plants held at -15° C. for one week. Other factors influencing winter hardiness were soil moisture, length of hardening period before exposure to low temperatures, duration of low temperature and amount of premature foliage loss. Varietal cold resistance is discussed.—Univ. Minnesota, St. Paul.

704. GARBER, E. D.

The genus *Collinsia*. VI. Distribution of pigments in the flowers.

Bot. Gaz., 1958, 119: 240-3, bibl. 5.

Three anthocyanidins (delphinidin, cyanidin, and peonidin or pelargonidin) and three yellow pigments were detected in a chromatographic study of the upper lip, lateral lobes, and corolla tube of flowers of several genotypes of *Collinsia heterophylla*, *C. tinctoria*, and a number of other species of *Collinsia*. The presence or absence of an anthocyanidin or yellow pigment in a specific flower part was genetically determined in *C. heterophylla* and in *C. tinctoria*. Certain pigments in specific flower parts of the amphiploid *C. concolor* $\times$ *C. sparsiflora* could not be detected in either parental species. Although differences in the distribution of pigments in different flower parts of species could be detected, it was not possible to correlate these differences with any known taxonomic relationships. [Author's summary.]—Dep. Bot., Univ. Chicago.

705. KOFRANEK, A. M., KOHL, H. C., Jr., AND LUNT, O. R.

Effects of excess salinity and boron on geraniums.

Proc. Amer. Soc. hort. Sci., 1958, 71: 516-21, bibl. 5.

The production of terminal cuttings by geraniums was reduced by 43% when the salt concentration in the root zone was increased from 15 me./l. to 45 me./l. Toxicity symptoms appeared on the leaves of plants treated with 195 me./l. of salts about 1 month after the treatments began. Leaf widths decreased as salt concentration increased. Of 3 varieties Better Times was the least resistant to high salinity, and Ricard the most resistant. Both Ca and Na accumulated in the older leaves of geraniums and tended to displace K. Mg absorption increased at the higher concentrations of Na and Ca. The addition of 2 p.p.m. B to the basic nutrient solution caused a 12% reduction in the number of terminal cuttings produced. Leaf widths increased at this level of B, but were reduced at higher levels.—Univ. Calif., Los Angeles.

706. AMER, F. A., AND WILLIAMS, W. T.
Drought-resistance in *Pelargonium zonale*.
Ann. Bot. Lond., 1958, 22: 369-79, bibl. 21, illus.

The small persistent leaves produced by *Pelargonium* when water is withheld have been investigated in respect of their production, structure, carbohydrate changes, and transpiration characteristics. It is concluded that these leaves show no special adaptations, but are merely normal leaves arrested in an immature condition. Their survival during drought is attributed to the incomplete vacuolation of the cells, and the findings are consistent with Lin's views on the importance of mechanical protoplasmic damage, caused by excessive shrinkage, in drought-injury. [Authors' abstract.]—Bot. Dep., Univ. Southampton.

707. GIANFAGNA, A.
Geranium flower life extended by gibberellic acid treatment.
Flor. Exch., 1958, 131 (11): 14, 35.

Three varieties of geranium (Graff's White, Graff's Pink and Olympic Red) were sprayed with 5, 10, 20 or 50 p.p.m. gibberellic acid (GA) plus spreader when the flower buds were just showing colour. Treatment increased flower diameter from 3–3½ in. in the controls to 4½ in., lengthened the peduncles and increased the size of the petals; it also prevented early browning of the centre florets to which certain white varieties are particularly prone, and prolonged the life of the flowers by 10–14 days. Commercial tests with several varieties, using ½ or 5 p.p.m. GA, confirmed these results, although with Red Irene treatment reduced the firmness of the flower stalks. The time of treatment was found to be very important, the best time being from when flower colour was just visible to when some florets were beginning to open. Buds treated before this stage either blasted or developed abnormally. Treatment in winter or under poor light conditions was less effective than that in spring and in good light. The potassium salt of GA

and aerosol formulations were as effective as the commercial liquid preparation. [See also *H.A.*, 28: 690.]—Pa St. Univ.

708. EHRLE, L., AND TRESCH, W.
Die Humusversorgung bei der Gerbera-Kultur. (Humus supply in gerbera growing.)
Gartenwelt, 1958, 58: 275-7, bibl. 2, illus.

An application of 75 kg. rotted stable manure per square metre to gerberas growing in a fairly light sandy soil gave somewhat better results than several proprietary organic manures. Specially prepared peat was a satisfactory substitute for manure, provided the pH was maintained at 6.0–7.5 by liming, particularly in the second year. The experiments are being continued.—Lehr- u. Versuchsanst. f. Gemüse-, Obst- u. Gartenb. Straelen-Niederrhein.

709. RØNNIKE, F.
Influence of preliminary growth conditions on elongation of roots in nutrient solutions. Experiments with *Lupinus albus*.

Physiol. Plant., 1958, 11: 421-40, bibl. 17, illus.
A proprietary brand of sphagnum was preferable to filter paper as a preliminary medium for germinating lupin seeds. The water content and degree of purity of the medium, as well as the temperature and duration of preliminary growth, markedly affected the subsequent growth of seedling roots in nutrient solutions. Conditions in the preliminary phase, however, did not affect the roots' sensitivity to various organic compounds. Elongation under standardized conditions was recorded over a complete year. Reproducibility of results was best for high growth rates.—Roy. vet. agric. Coll., Copenhagen.

710. STINSON, R. F.
The effect of light intensity on the initiation and development of flower buds in the saint-paulia.
Diss. Abstr., 1958, 18: 1201-2, being *Publ.* 25,422 of 44 pp.

Saintpaulia plants were grown at various light intensities until flower buds became visible. Floral initials and signs of inflorescence branching were evident in plants grown at light intensities of 500 f.c. or higher. Lower light intensities appeared to have an inhibiting effect on flower initiation. Floral organs were initiated in acropetal succession. No case of arrested flower development was observed, which suggests that the light conditions that favour flower initiation are identical with those that favour flower development.—Ohio St. Univ.

711. GUGENHAN, —.
Antirrhinum—Ganzjahreskultur. (Growing snapdragons all the year round.)
Gartenwelt, 1958, 58: 260-1, illus.

The varieties Indian Chief and Navajo were sown at intervals of 1½ months, and planted out under

glass or in the open at 10×15 cm. Under conditions of poor light intensity flowering was not satisfactory, and other varieties are therefore being tested.—*Staatssch. Gartenb. GartenbWirtsch., Stuttgart-Hohenheim.*

712. SEMENIUK, P.

Effects of temperature on seed production of *Matthiola incana* (L.) R.Br.

J. Hered., 1958, 49: 161-6, bibl. 7, illus.

An inbred line of ever-sporting *Matthiola incana* was used to test the effects of 55°, 65°, 75°, and 85°F. during the flowering period on seed production. The effects of two different relative humidities at 75° F. on the production of seeds were also tested. The production of fruits and seeds per plant was greater at 65° than at the other temperatures tested. The plants maintained at 85° were entirely sterile. Pollen obtained from plants grown at this temperature was 91% empty and failed to germinate on a medium composed of 20% sucrose and 2% agar. Pollen from plants grown at the other temperatures germinated, but that from the plants maintained at 75° produced shorter tubes than pollen from plants in the 55° and 65° chambers. Pollen from plants in the 85° chamber failed to function on highly fertile flowers produced in the 65° chamber. Effects on floral morphology were evident in the plants kept at 85°. Most of the anthers failed to dehisce at this temperature. Furthermore, the calyxes split and anthers bent away from the stigma so that self-pollination was obstructed. The plants in the 85° chamber were female-sterile as well as male-sterile. No significant differences were observed between the plants in the two chambers at 75°, maintained at approximately 70% R.H. and at the prevailing R.H. of approximately 45%. Some of the flowers at this temperature had split calyxes, but splitting was less than at 85°. A highly significant reduction in seeds per plant at 75° as compared with 65° was due mainly to the failure of approximately 50% of the flowers to set fruits. A highly significant reduction in seeds per plant at 55° in comparison with 65° was due primarily to the formation of fewer flowers at the lower temperature. The results show that after bud initiation at 55°, 65° was the most favourable temperature tested for the maximum production of seeds. [From author's summary.]—U.S. Dep. Agric., Beltsville, Md.

713. DADD, A. H., AND JACOBS, S. E.

The uptake of mercury by seeds treated with mercuric chloride solution, and its subsequent release.

J. appl. Bact., 1958, 21: 97-9, bibl. 5.

It has been known for some time that washing seeds following treatment with mercuric chloride does not always effect the complete removal of mercury. In some cases residual mercury may reduce germination or the vigour of the emerging seedlings,

and among legumes it may reduce nodulation. In an experiment described in this paper sweet pea seeds were soaked in a 0.2% mercuric chloride solution for 15 minutes. A considerable quantity of mercury was taken up, and a washing procedure, that was more thorough than that usually applied after the surface sterilization of plant tissues, failed to remove it. To remove the greater part of the mercury, soaking the seed for 48 hours was needed. In a similar investigation with two other chemicals, silver nitrate was absorbed like mercury, but Chloramine-T proved easy to remove.—*Imp. Coll. Sci. Tech., London.*

Bulbs, tubers, etc.

(See also 8, 261, 348-350, 773i, j, q, z, 774a, d, e, g, j, o, 1002.)

714. HORTON, D. E.

Bulbs.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 19-30.

Nutrition: In cumulative experiments over 5 years with narcissi, tulips and irises, treatments containing K resulted in the largest flowers on the strongest stems, as well as in the strongest foliage. The weakest growth was produced on the N and P plots. The weight of bulbs lifted was considerably higher with K applications than with N or P. Optimum K levels have not yet been determined. **Tulip cropping and heading:** With Rose Copland and Golden Harvest cropping for market, i.e. leaving 1 leaf on each plant, allowed a stock of bulbs to be maintained, but leaving 2 leaves per plant resulted in a better increase in bulb weight. **Freesias**, raised from seed sown on different dates, were mulched with soil, sawdust, peat or sand 1 in. deep immediately after sowing. The earliest (April) sowing gave the highest yield, with 68% of the flowers being produced before Christmas; the latest (June) sowing gave the lowest yield with only 2% flowering before Christmas. The best cropping results were given by the sand mulch. **Tulip hot water treatment (H.W.T.).** Varietal reactions during storage and subsequent growth to H.W.T. at 110.5° F. for 2½ hr. are noted. Controlled storage before and after treatment was found to be an important factor in the success of H.W.T. for eelworm control. Preliminary tests are reported on H.W.T. at 115° and 120° F. **Mobile houses:** A method is described of forcing tulips under a mobile house, the bulbs being pressed into the soil and covered with 3 in. of wet peat. In January when the shoots were 1½-2 in. high, most of the peat was removed and the house was drawn over the site. At harvest the whole plant was pulled with bulb attached.

715. JEFF, A. E.

Anemones.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 4-11.

nutrition: Dung alone gave higher yields than dung+NPK or than any combination of N, P and K, but adequate K and a good balance between N and K were important. On soil with a pH below 6 growth of anemones was severely checked. Top-dressing with inorganic N, especially in autumn, depressed the yield of flowers. **Cultural operations:** In general, highest yields per acre were obtained from the highest corm population planted and from the earliest planting (late May). **Diseases:** Soil fumigation with either formalin or chloropicrin in May considerably reduced the incidence of infection by *Peronospora ficariae* until the autumn, but as a result of secondary infection there was no difference in disease incidence by mid-winter. For control of *Botrytis* timing of sprays proved important; they should be applied immediately after any damage from frost or wind has occurred; Dithane Z 78 gave the best control and resulted in the highest production of large flowers. **Weed control:** The best pre-emergence treatments were sulphuric acid, T.V.O. and flame weeding. All post-emergence treatments caused considerable damage to the anemones. **Protection from weather:** Bamboo screens were difficult to handle and plots sheltered by them produced the lowest number of marketable blooms. Mobile catch lights were better, but the best yields were obtained under flat-topped cloches with the top glass in position only during bad weather.

16. CAMPBELL, W.
Anemone downy mildew (*Peronospora ficariae*).
A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 82-3.

Plots infected with *Peronospora ficariae* was treated with 4% formaldehyde at $\frac{3}{4}$ gal./sq. yd., 10% formaldehyde at $\frac{1}{4}$ gal./sq. yd. or sodium-m-dithiocarbamate at 2 oz./sq. yd. (applied in water at 1 lb. per 30 gal. per 20 sq. yd.). By September anemones planted on the control plots had 30% primary infection. Both formaldehyde treatments reduced primary infection to 7% and the dithiocarbamate treatment gave almost complete control. Secondary infection occurred very rapidly, however, and by the end of October most of the plants were infected. The yield of flowers per corm was: control 2.21, 4% formaldehyde 3.74, 10% formaldehyde 3.77, dithiocarbamate 4.64.

17. PAULIN, A.
Étude de l'action de températures élevées sur les "cormus" de glaïeuls en vue de hâter la floraison. (Studies on the effect of high temperature on gladiolus corms with a view to forcing.)
Rev. hort. Paris, 1958, 130: 1921-3, bibl. 1, illus.

Maximum acceleration of flowering with Snow Princess was obtained after storage at 28° C. for

60 days. Flowering of corms stored at 34° C. was similar to that of control corms stored at 10° C. Corms from the south of France, stored at 10° C., flowered at about the same time as those from the Paris region, which had been stored at 22° or 28° C.

718. EL-GAMASSY, A. M.

Effectiveness of chemical treatments in breaking the rest and sprouting of gladiolus corms. [Arabic summary $\frac{2}{3}$ p.]

Ann. agric. Sci. Cairo, 1957, 2 (1): 239-46, bibl. 23.

Seventy-five days after planting sprouting had occurred in 87% of the Valeria gladiolus corms treated with ethylene chlorohydrin vapour; of those left untreated or treated with thiourea or potassium thiocyanate dips only 0%, 3% and 18%, respectively, sprouted. A mixture of thiourea and KSCN was as effective as the sum of the effects of each chemical used separately. The larger corms responded more readily to the chemical treatments than the smaller ones, which sprouted much later. A significant increase of 0.6 sprouts per corm occurred when ethylene chlorohydrin vapour was used, but the increase in the number of sprouts per corm following the other treatments was not significant.—Univ. Ain Shams, Cairo. J.R.L.

719. TSUKAMOTO, Y., AND YAGI, M.

Dormancy of gladiolus corms. (IV.) The effect of auxin spray on breaking dormancy of gladiolus corms. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1958, 27: 144-8, bibl. 12.

Leaf applications of NAA (at 10, 50 and 100 p.p.m.) were given at weekly intervals during growth. After digging, the corms were held at 35° C. for 5 days and then at 0° C. for 25 days. In general, high levels of NAA inhibited sprouting. Treated corms showed abnormal root formation and reduced ability for regeneration (as indicated by reduced corm weights and cormel numbers). Similar treatment during growth with tryptophan resulted in a slight promotion of sprouting. Corm sprouting was inhibited when they were soaked in an aqueous solution of NAA (10, 50 and 100 p.p.m.) for 14 hours. [For part III see *H.A.*, 28: 704.]

720. JENKINS, J. M., Jr.

The effects of soil acidity upon the growth of gladiolus.

Flor. Exch., 1958, 131 (3): 11.

In experimental plots Snow Princess was not particularly sensitive to differences in soil reaction within the range of pH 4.8 to 6.5. Both flower and corm yields declined after S applications had reduced the soil pH to 4.4 or 4.5. Maximum flower and corm yields were obtained at soil pH values between 5.5 and 6.0.—N.C. St. Coll.

721. WOLTZ, S. S.

Gladiolus fertility studies.*A.R. Fla agric. Exp. Stats*, 1956-57, pp. 302-3.

Increasing levels of N and K₂O applied to Picardy and Valeria resulted in increasing the average percentages of N and K respectively in the corms, except at the highest K₂O level (320 lb. per acre). In an NPK experiment results were variable, but there was a tendency towards lower yields in minus-P plots.

722. MAGIE, R. O.

Control of gladiolus corm diseases.*A.R. Fla agric. Exp. Stats*, 1956-57, pp. 296-9, illus.

Sixteen fungicides were tested against *Fusarium* and *Curvularia* infection, and the best treatments in terms of flower and corm production were Thimerosal at 3-4 oz./100 gal. and Dowicide B at 4 lb./100 gal. used as a 15 min. corm soak before storage or planting. Flowering of Valeria and Picardy was delayed by pre-storage treatment with Thimerosal or Dowicide B and by pre-planting treatment with N.I. Ceresan; flowering of June Bells was not delayed. More healthy corms were produced after pre-storage treatments that delayed flowering than after treatments which did not affect flowering. Soaking corms in Omadine 1456 at 10 oz./100 gal. or in Actidione at 1 oz./100 gal. was as effective in controlling infection by *Fusarium oxysporum* f. *gladioli* as Dowicide B and Thimerosal. Husk removal from Picardy and June Bells about 2 weeks before planting resulted in the doubling of flower production and in increased corm production, compared with the 5 min. pre-planting soak in N.I. Ceresan. Core removal also resulted in increased corm production. When planted 10 days after soil fumigation with Vapam or Crag Mylone for *Stromatinia* control, corms showed no evidence of chemical injury. Crag Mylone was the most effective fumigant in *Fusarium*-infected soil. [See also *H.A.*, 28: 2896.]

723. MAGIE, R. O.

Control of gladiolus leaf and flower diseases.*A.R. Fla agric. Exp. Stats*, 1956-57, p. 300.

Flower infection by *Botrytis gladiolorum* was reduced in some varieties by 200 p.p.m. griseofulvin, 5% griseofulvin dust, 100 p.p.m. Mycostatin (precipitated from dimethyl sulphoxide solution), 100 p.p.m. Mycostatin wettable powder, 50 p.p.m. Omadine 1769, 100 p.p.m. Omadine 6-1-1693 and 25-50 p.p.m. Omadine 4-1692. One to two sprays per week of Dyrene at 1½ lb./100 gal. protected Florence Nightingale against *Stemphylium* leaf spot.

724. MAGIE, R. O.

Eradicative fungicides for control of gladiolus *Botrytis*.From abstr. in *Phytopathology*, 1958, 48: 395.

Heavy production of *Botrytis* conidia on frost-damaged gladiolus leaves and rotted necks prevented control of flower bud rot in spite of daily spraying with zineb. Conidial production on grey-moulded tissue was only 7-17% of that on control leaves after heavy spraying with: 2.4% methyl mercury 8-hydroxyquinolate (Ortho LM Seed Protectant), 1-2 qt./100 gal.; CM-19, water-soluble phenolic complex 28.5% (19% substituted halogenated phenols), 1 qt./100 gal.; 7.5% tris (2-hydroxyethyl) (phenyl mercuri) ammonium lactate (Puratized Agricultural Spray), 1 qt./100 gal.; and 60% 1,2-bis (ethylsulphonyl)-1,2-dichloroethylene (du Pont Experimental Fungicide), 2 lb./100 gal. Maneb at 2 lb./100 gal. was less effective, because of leaching rain. Over 2 in. of rain leached the sprayed leaves 1-2 days after each application, but the effectiveness of du Pont Experimental Fungicide and of Ortho LM Seed Protectant increased in spite of it. Thiram, zineb and captan at 2 lb./100 gal. were ineffective.

725. GOULD, C. J.

The dry rot disease of gladiolus.*Plant Dis. Repr.*, 1958, 42: 1011-24, bibl. 75, illus.

This paper reviews the literature on the dry rot disease of gladiolus caused by *Stromatinia* (= *Sclerotium*=*Sclerotinia*) *gladioli*, and presents hitherto unpublished data from certain experiments, concerned especially with soil treatment, which were carried out at the Western Washington Experiment Station. Five aspects are considered:—(1) The disease (symptoms, distribution and importance); (2) the pathogen; (3) factors affecting infection (longevity, temperature, moisture, nutrition, etc.); (4) corm treatment (fungicides, hot-water treatment of corms; and (5) soil treatment with fungicides and fumigants. The following control procedure is suggested for trial:—(i) Discard all diseased corms from lightly infected stocks and all corms from severely infected stocks; (ii) dip corms for 5 min. in thiram (8.2 lb. active ingredient per 100 gal.) just before planting; (iii) plant in heavy, but well drained soil; (iv) avoid excessive applications of N and Mg; (v) where non-infected soil is not available try treating the area with either thiram, Vapam or methyl bromide; and (vi) dig corms early, cure them rapidly at 80° to 90° F., clean them and store them under cool, dry conditions.

726. HOLMES, E. S., AND MYERS, J. M.

Precooling and transit refrigeration of gladioli.*A.R. Fla agric. Exp. Stats*, 1956-57, pp. 38-40.

During transit the temperature of precooled gladioli was kept at 50° F. by ice bunker refrigeration. In a box of non-precooled gladioli in the centre of a precooled load, 50° F. was not reached.

until 24 hours after loading. Temperature variations in flowers precooled after packing were large and better results were obtained by precooling before packing. Precooling by the vacuum process took approximately 15 min. Low temperatures were maintained longer when flowers were kept in non-ventilated boxes.

727. CHANDLER, P. A., AND BALD, J. C.

Pathogen-free lilies from cultured bulb-scales.

Abstr. in *Phytopathology*, 1958, **48**: 391.

Adventitious bulblets were produced on surface-sterilized scales of *Lilium longiflorum* cultured in tubes on potato dextrose agar. The best time to sample bulb scales for treatment was during or soon after flowering. Later, diminishing numbers of bulb scales were made aseptic by washing in running water and surface-sterilizing. Organisms entered the scales at the tip and base. Many of these organisms, including *Fusarium* spp., were killed by hot-water treatment at 125° F. for 30 minutes, the scales were unharmed, and a maximum yield of aseptic bulbils was obtained when the hot-water-treated scales were cultured—up to 50% in some lots. The treatment was applied successfully to varieties of *L. longiflorum* other than Croft, and to *L. candidum*. The combination of hot-water treatment and culturing is a possible means of obtaining elite stocks of established lily varieties for commercial production. [See also *H.A.*, 1958, **23**: 3760.]

728. OKADA, M., AND MIWA, S.

Studies on the structure and life-cycle of scaly bulb. 1. On the trumpet narcissus.

[Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1958, **27**: 135-43, bibl. 5, illus.

The differentiation and growth of scales, lateral bulblets, flowers and a new growing point are described for the variety King Alfred with the aid of photographs and line drawings.

729. MINISTRY OF AGRICULTURE, LONDON.

Narcissus pests.

Bull. Minist. Agric. Lond. **51**, 5th edition, 1958, pp. 37, bibl. 41, illus., 4s. 6d.

This bulletin follows the pattern of the previous edition [*H.A.*, **23**: 1044], but the text has been extensively revised. In particular, information is given on cold dips for control of narcissus flies, on recent developments in hot-water treatment, and on cold dissection as a guide to the correct timing of hot-water treatment. There are some helpful new photographs.

730. WOODVILLE, H. C.

Experiments on the control of bulb fly damage.

A.R. Rosewarne exp. Hort. Stat. 1957, 1958, pp. 84-5.

Experiments with narcissi showed that a 15-min.

cold dip in 0.2% aldrin is still the best method of protecting bulbs against bulb fly attack. A chlordane cold dip was also effective but more expensive. The addition of chlordane or heptachlor to the standard hot water bath did not afford very good protection and is not considered a safe procedure. The use of aldrin dust in the drills immediately prior to planting gave promising results.

Lawns and sports turf.

(See also 773p.)

731. DAWSON, R. B.

Sea-marsh turf.

Gdnrs' Chron., 1958, **144**: 126, illus.

Notes are given on the preparation, lifting and transport of natural sea-marsh turf, consisting mainly of *Festuca rubra* and *Agrostis stolonifera*. It is suitable for bowling greens but not for domestic lawns, owing to maintenance difficulties.—Sports Turf Res. Inst., Bingley. J.R.L.

732. ANON.

Camouflage for chalk cliffs.

Park Administ., 1958, **23**: 199, illus.

On chalk banks 120 ft. high, at an angle of 70°, a mixture of soil, grass seed and grit has been blown on, using pneumatic guns normally used for spraying concrete.

733. NUTTER, G. C., AND BRYAN, T. F.

Vegetative propagation studies with southern turf grasses.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 122-3, illus.

With bermuda grass 100% lateral extension occurred within 30 days where 2-in. plugs were planted on 6-in. centres; $\frac{3}{4}$ -in. plugs on 12-in. centres proved the slowest method of propagation, needing 10 weeks to attain 100% extension. Extension of St. Augustine grass (*Stenotaphrum secundatum*) with these 2 planting methods was 100% extension in 45 days, and 9.3% after 5 months. Two-inch plugs of manila grass (*Zoysia matrella*) planted on 6-in. centres produced 100% extension within 10 weeks.

734. EDMOND, D. B., AND COLES, S. T. J.

Some long-term effects of fertilizers on a mown turf of browntop and Chewing's fescue.

N.Z. J. agric. Res., 1958, **1**: 665-74, bibl. 8, illus.

A study was made of the effects of different fertilizers on a turf of browntop and Chewing's fescue [*Agrostis tenuis* and *Festuca rubra* var. *commutata* respectively, which produce a turf suitable for greens in New Zealand]. Where ammonium sulphate was the predominant fertilizer, a dense uniform turf developed, with increased soil acidity and volume weight, disappearance of earthworms and the formation of a mat of

living and dead plant tissue, 1-1½ in. deep. Without the acidifying effect of ammonium sulphate, the turfs were more open and heterogeneous, there was no mat formation and worm activity was high. [From authors' summary.]-D.S.I.R., Palmerston North.

735. DeFRANCE, J. A.

Turf fertilization development.

Parks, 1958, 23: 769-70, and 24: 24-30.

The Rhode Island 20-6-6 Ureaform compound fertilizer, containing methylene urea, has given excellent results on turf, providing both quickly available and slowly released N. For putting greens the best rate of application of Ureaform N is 8-10 lb. per 1,000 sq. ft. per year, whereas for fairways and lawns 6 lb. is preferable, applied in a single dormant dressing. For seedbeds the application of 20-6-4 Ureaform at 8 lb. per 1,000 sq. ft. at the time of sowing in the spring is recommended; this resulted in excellent turf ready for transplanting in 4-5 months, whereas with conventional fertilizers a year is required between sowing and transplanting.—Rhode Island agric. Exp. Stat., Kingston.

736. NUTTER, G. C., SUMRELL, B. B., AND LAGASSE, R. A.

Nutritional studies on turf grasses. A. Effect of nitrogen treatments and vertical mowing on performance of putting green turf. B. Nutrition studies on centipedegrass turf.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 121-2.

Bermuda grass putting greens were given 3 sources of N and cut at fortnightly or monthly intervals. Yield was reduced more by fortnightly mowing than by monthly mowing, but the effect of mowing frequency on quality was less pronounced. The best quality turf was produced by activated sewage sludge treatments, and the poorest by urea-formaldehyde. Sodium nitrate and ammonium nitrate induced Fe chlorosis on centipede grass [*Eremochloa ophiuroides*]. This effect was not observed on plots treated with ferrous ammonium sulphate (7% N, 13% Fe), nor, to any appreciable extent, on plots receiving activated sewage sludge, castor pomace or urea-formaldehyde formulations.

737. (LANTZ, H. L.)

Test fertilizers on turf and bent grass.

La Fm Sci., 1958, 13: 43.

Non-irrigated plots of turf grass were given dressings of various fertilizers in spring. There was a marked response to all treatments, but Uramite plots showed an exceptionally vigorous green turf in September. A single application of Uramite at 10 lb. per 1,000 sq. ft. was sufficient to induce moderate growth throughout the season.

Early September application of fertilizer, however, produced even better turf than spring application. On bentgrass plots Milorganite, Golden Vigoro and Uramite fertilizers all proved satisfactory so long as the total amount of N applied during the season amounted to 5-6 lb. per 1,000 sq. ft. Uramite proved more satisfactory when 3 split applications were made throughout the season.

738. WISNIEWSKI, A. J., DeFRANCE, J. A., AND KOLLETT, J. R.

Results of ureaform fertilization on lawn and fairway turf.

Agron. J., 1958, 50: 575-6, bibl. 5.

On soil containing adequate P and K, turf responded markedly to a mid-March dressing of 6 lb. N per 1,000 sq. ft., applied as ureaform or in commercial fertilizers consisting mainly of ureaform. Simple ureaform was slower in action. A spring application of 4 lb. N per 1,000 sq. ft. followed by an equal amount in August was less satisfactory, in that growth was less uniform over the season.

739. GOULD, C. J., AUSTENSON, H. M., AND MILLER, V. L.

Fairy ring disease of lawns.

Stats Circ. Wash. St. agric. Exp. Stats, 330 1958, pp. 5, bibl. 2, illus.

In western Washington fairy rings, caused by *Marasmius oreades*, are particularly troublesome on lawns suffering from lack of proper fertilization and from insufficient water. Among numerous compounds tested as drenches during the past 12 years the most satisfactory control has been given by phenylmercury acetate, and recommendations are made for preparing and applying it. Promising results have also been obtained with fumigation by methyl bromide, and the procedure adopted which at this stage is suggested for trial only, is outlined. Other possible methods of control, now being tested, are mentioned.

740. ZUMMO, N., AND PLAKIDAS, A. G.

Brown patch of St. Augustine grass.

Plant Dis. Rep., 1958, 42: 1141-7, bibl. : illus.

Evidence is presented which shows that this destructive disease of lawns of St. Augustine grass (*Stenotaphrum secundatum*) is caused by *Rhizoctonia solani*. Nine fungicides, each at 2 or more rates, were tested against the disease. Only two of them were effective. Terraclor (pentachloro nitrobenzene 75% w.p.) gave complete control in each of 31 tests, in which the rates applied ranged from 20 g. to 136 g. per 100 sq. ft., but rates exceeding 100 g. it was phytotoxic. Puritized 177 (phenyl amino cadmium dilactate 100% at 10 g. and 20 g. per 100 sq. ft. also gave perfect control in 2 tests.—La St. Univ., Baton Rouge.

Orchids.

See 773n, 774b.

Succulents.

(See also 773h, w.)

741. SCHWABE, W. W.

Effects of photoperiod and hormone treatment on isolated rooted leaves of *Kalanchoë blossfeldiana*.

Physiol. Plant., 1958, **11**: 225-39, bibl. 28, illus.

Detached rooted leaves of *Kalanchoë blossfeldiana* responded to short-day treatment by increasing markedly in thickness, fresh weight and water content in comparison with long-day controls, these increases being entirely due to cell enlargement. These responses were not significantly modified by spraying with IAA at 5-500 p.p.m. or by lanolin emulsions of IAA or TIBA. Flowering could not be induced in plants used as rootstocks and receiving treated or control leaves or even flowering roots as scions. On a dry-weight basis the short-day leaves were richer than the long-day leaves in organic acids, but acid concentrations in the sap were approximately equal.—*Imp. Coll. Sci. Tech., London*.

742. RODRÍGUEZ LÓPEZ, M.

Fructificación de *Yucca gloriosa* por el tratamiento con substancias de crecimiento. (Fruit set in *Yucca gloriosa* induced by growth-substance treatment.)

Bol. Inst. nac. Invest. agron. Madrid, 1958, **18**: 315-17, bibl. 1, illus.

Yucca gloriosa, an ornamental, is infertile in Spain owing to the absence of the pollinating insect *Conuba* sp. Spraying the flowers with 2,4-D or naphthoxyacetic acid, each at 1,000 p.p.m., prolonged the life of the flowers on the plant and resulted in some fruit set. The fruits had sterile seeds. Fruit development was better with 2,4-D than with β -naphthoxyacetic acid.

Roses.

(See also 70q, 329, 680, 773c, k, v.)

743. DICKEY, R. D., AND MCFADDEN, S. E., JR.
Native and introduced ornamental plants.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 117-18.

A study of field production of Happiness roses, Double White Cherokee rootstocks were the most promising of 5 tested. Roses mulched with sawdust did not crop as well as those mulched with nut hulls. No phytotoxic effects were noted following 2 applications of the following nematocides: Nema-gon 5 lb. technical per acre; parathion 1 lb. technical per acre; and VC-13 215 lb. per acre.

744. MACHOVEC, J., AND KOPEC, K.

Chromatografická studie chemických změn ve stimulovaných i nestimulovaných řízciích některých dřevin a jejich vztah k zakořeňování. (A chromatographic study of chemical changes in treated and untreated cuttings of some woody plants in relation to rooting.) [Russian and German summaries 5 and 6 lines.]

Acta Univ. Agric. Silv., Brno, Ser. A, 1957, No. 3, pp. 349-56, bibl. 14.

The rooting capacity of rose (*Rosa gallica splendens*) softwood cuttings depended not only on the total content of sugars but also on their qualitative composition. During flower formation the monosaccharide content fell and the sucrose content rose, and simultaneously the rooting capacity improved. During hip formation the ratio was reversed and rooting ability declined rapidly. Treatment with solutions of α -naphthylacetic or β -indolylbutyric acids caused an immediate rise in sucrose synthesis, but this was soon followed by a decline, i.e. a radical change took place in metabolism resulting in poor rooting. In the other woody ornamentals studied a relationship was also found between sugar metabolism and rooting capacity, but this varied with family, species and variety and was affected by growth substances.

745. PRIDHAM, A. M. S.

Defoliants for roses.

Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 130-2, bibl. 2.

Formulation A6 (containing endothal 4069 2%, chelated copper and zinc both 2.5%, chelating agent 2.5%, wetting agent Nonic 218 5%, and American Cyanamid Co. 6249 2%) was shown to enhance defoliation of privet and rose (var. Better Times) at a temperature of 50° F. compared with endothal 4069 2%. When copper salts 2.5% were added to endothal 4069 2%, defoliation was stimulated but less than by the A6 group. In another trial where the A6 formulation was modified to: endothal 4069 2% by volume, American Cyanamid 6249 0.1% by weight, chelated copper, zinc and iron, each 1% by weight, and Nonic 3% by volume, this group gave 95% defoliation of roses (var. Red Radiance) after 7 days compared with 10% for endothal 4069 2%. Where chelates were reduced to 0.1% and Nonic to 1% defoliation was reduced to 60%.—*Weed Abstr.*, 7, No. 1476.

746. HARAMAKI, C.

Studies on the floral malformation of the greenhouse rose variety Better Times.

Diss. Abstr., 1958, **18**: 1931, being *L.C. Card No. Mic.* 58-2076 of 319 pp.

In petal malformation, which is commonly found in roses, the tips of the petals curl inwards, are darker than normal and only partially develop

in length. In mature malformed petals of Better Times roses the parenchyma cell arms were found to be shorter and the intercellular spaces were smaller than in normal mature petals. In general, malformed petals had a higher dry weight but a smaller percentage of water and relative turgidity than normal petals. There was a strong indication that any condition during growth which increases the rate of transpiration or reduces the rate of water absorption may increase the amount of flower malformation. In general, flower malformation increased after periods of high light intensity, high day temperature, low relative humidity and low soil moisture. In Better Times flowers malformation is also related to genetic constitution.—Ohio St. Univ.

747. SHER, S. A., AND MUNNECKE, D. E.

Nematodes and bacteria on rose.

Calif. Agric., 1958, 12(9): 9-10, illus.

Fumigation of rose soil by DD, EDB or chloropicrin eliminated nematodes (*Pratylenchus vulnus* and *Trichodorus christiei*), and rose growth was significantly better than in non-fumigated soil. In sterilized soil inoculated with *P. vulnus* rose plants showed disease symptoms, but no disease symptoms followed *T. christiei* inoculations or appeared in the unfested series. Leaves of plants infected with *P. vulnus* were lower in Fe, Cu and K than leaves of control plants [see also *H.A.*, 28: 2924]. No conclusive results were obtained from the inoculation of roses and other host plants with bacteria isolated from affected rose roots. Cuttings were dipped in 0.5% Purex for 20 min. before planting in fumigated soil, and the control of *P. vulnus* and an *Agrobacterium* species was evaluated. Soil fumigation again had the most striking effect on plant growth; the percentage of No. 1 grade plants was increased by over 400% by chloropicrin, which was the best of 5 fumigation treatments. Dipping had no significant effect on grade, but dipped cuttings had less hairy root (*Agrobacterium*) in all but one of the fumigation treatments.

748. DE BOER, S.

De bestrijding van sterroetdauw bij rozen.
(Control of black spot on roses.)

Boomkwekerij, Vol. 13, No. 18, reprinted in
Cult. Hand., 1958, 24: 313.

Sprays of zineb (0.3%) or captan (0.25%) controlled *Diplocarpon rosae* when applied from July to September at intervals of 7-10 days.—Proefst. Boomkw., Boskoop.

749. (LYLE, E. W.)

Sprays are best for blackspot control.

South. Flor. Nurserym., 1958, February 21,
summarized in *Flor. Exch.*, 1958, 131(10): 17.

In roses treated with fungicides against black spot,

starch contents in December were 24% to 52% higher than in control plants. In dusted plants the differences were between 24 and 36%, while in sprayed plants they were between 38 and 52%. The cost of spraying was half that of dusting. The heaviest plants were those sprayed with Phaltan (1 lb. to 150 gal.), although in its effect on black spot it was less persistent than maneb [see also *H.A.*, 28: 2922].—Texas Rose Res. Found.

750. McCLELLAN, W. D., TAYLOR, E. A., AND SMITH, F. F.

Winter treatments of dormant roses and their relation to blackspot and spider mite control.
Phytopathology, 1958, 48: 408-10, bibl. 17, illus.

Roses in 120 plots of 5 varieties each were used to determine the effect of dormant-cane spraying, ground spraying, pruning, and clean culture (weed and rose leaf removal and a sawdust mulch) on the severity of blackspot (*Diplocarpon rosae*) and of two-spotted spider mites (*Tetranychus telarius*). Pruning canes to within 1-2 in. of the bud union was the most effective preventive measure. A dormant-cane spray application of lime-sulphur, of any of 3 organic mercury fungicides, of an antibiotic (Actidione), or of monocalcium meta-arsenite was ineffective. Ground spraying with Elgetol and clean culture also were ineffective. Spider mite populations were reduced by clean culture, which destroyed their over-wintering weed hosts. Severely pruned rose plants produced few flowers early in the season, but as many as the unpruned bushes by the end of the season. [From authors' summary.]—Agric. Res. Center, Beltsville, Md.

Other trees and shrubs.

(See also 30, 327, 328, 681, 684, 687, 692, 693, 773b, g, o, r, t, y, 774i, p, q.)

751. PRESTON, W. H., Jr., AND HASTY, W. L.
Defoliation of woody plants sprayed with 2-butyne-1,4-diol as influenced by temperature and humidity.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): XLVIII-XLIX.

Plants of oak, elm, privet, hibiscus, mulberry, locust, laurel-cherry, acacia, pomegranate and persimmon were sprayed with a 35% aqueous solution of 2-butyne-1,4-diol ten days after being placed in rooms at controlled temperatures and humidities. Most plants showed 50% or more defoliation within 8 days from spraying, and several showed 90-100% defoliation within 3-4 days. Defoliation was more rapid at 77-83° F. than at 90-96° F. under conditions of continuously high relative humidity (70-88%). At a lower humidity of 47-53% defoliation was more rapid at high than at moderate temperature.—U.S.D.A., Glenn Dale and Fort Detrick, Md.

752. PRIDHAM, A. M. S.
Preliminary tests with three additional materials as defoliants for nursery stock.
Proc. 12th annu. Mtg N.E. Weed Control Conf., 1958, pp. 133-7.
- Folex and Def (both tributylphosphorotrithioate), each with or without endothal, were compared with endothal alone in defoliation trials with privet (*Ligustrum ovalifolium*) and rose (*Rosa adiclecta*) var. Better Times. They produced little reaction in privet except when combined with endothal, but with rose used separately or with endothal were as effective as endothal alone. The following plants responded to treatment in October and November: *Hydrangea hortense* (1-2% Folex or Def), 30 rose varieties (2% Folex+copper) [see abstr. 745], forsythia (Folex+copper or A6), Chinese chestnut (*Castanea mollissima*) (2% Folex or Def) and peach (1-2% Folex or Def; regrowth doubtful though no obvious injury). In a field trial with Better Times roses the following percentage of defoliation was obtained: 1% endothal 60, 1% Folex 50, A6 70 (injury), A6+1% Folex 75 (injury), A5+0.5% Folex 95.—From *Weed Abstr.*, 7, No. 1474.
753. WILNER, J., AND VAARTAJA, O.
Prevention of injury to tree seedlings during cellar storage.
 Reprinted from *Forestry Chron.*, 1958, 34: 132-8, bibl. 10.
- Survival of tree planting stock following cellar storage by various methods was consistently good when the storage method included packing the roots in damp peat. Manitoba maple [*Acer negundo*] and American elm [*Ulmus americana*] needed such protection more than caragana [*C. barborescens*] and green ash [*Fraxinus pennsylvanica* var. *lanceolata*]. Prestorage treatments with various fungicides increased survival only slightly, but were injurious. It was demonstrated that injurious desiccation of stored plants may be determined by electrolytic methods. [Authors' abstract.]-Hort. and Forest. Biol. Divs, Dep. Agric., Ottawa.
754. ANON.
Control of azalea leaf gall, spot.
Ore. ornam. Nursery Dig., reprinted in *Flor. Exch.*, 1958, 131 (11): 27-8.
- Azalea varieties that are susceptible or resistant to leaf gall (*Exobasidium vaccinii*) are listed. Several fungicides gave good control of the disease when the first spray was applied early in the season (April) and 5 additional sprays were applied at 2-3-week intervals. Copper A and nabam were slightly more effective than ferbam or Puratized Agricultural spray. These fungicides also controlled azalea leaf spot (*Septoria azalea*), provided the first application was made in late February or early March.
755. RAABE, R. D., AND LENZ, J. V.
Septoria leaf scorch of azalea.
Calif. Agric., 1958, 12 (10): 11, illus.
- Several fungicides were tested for the control of *Septoria azaleae*. They were applied 5 times at 10-day intervals following pinching back in autumn, and also 5 times at 10-day intervals following pinching back about the first of February. All treatments were considerably better than the control (ammoniacal copper). Vancide 51 caused slight leaf injury. Dithane Z-78 and Zerlate resulted in the least number of infected leaves when used at concentrations specified by the manufacturer. Dyrene has also given excellent control, but injured some varieties.
756. STAŇKOVÁ-OPOČENSKÁ, E., AND SOUKUP, J.
Příspěvek k otázce rozmnožování kamelií. (A contribution to camellia propagation.)
 [Russian summary 8 lines.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1958, 31: 189-96, bibl. 8, illus.
- In attempts to improve the rooting of cuttings of *Camellia japonica* var. *chandleri elegans* 3 growth substances, summer and winter cuttings and horizontal and oblique cuts were tested. The best results were obtained by soaking winter cuttings that had been cut obliquely for 12 hrs in a mixture of 50 mg. β -indolylacetic acid+50 mg. nicotinic acid in 1 l. water. Treatment with β -indolylacetic acid+ β -indolylbutyric acid of the same concentration was also satisfactory. The growth substance treatment reduced the time winter cuttings took to root by 8 weeks.
757. ENDO, T.
Separation of anthocyanin and leuco-anthocyanin in flowers of *Camellia japonica*.
Nature, 1958, 182: 801, bibl. 4.
- Analytical results are described which show that the flowers of some camellia varieties contain leuco-anthocyanin, irrespective of their colour.—Nat. Inst. Genet., Misima, Sizuoka-Ken, Japan.
758. DAVIES, W. E.
Relation of time of year and short photoperiod to floral initiation and development in *Gardenia grandiflora*.
Diss. Abstr., 1958, 18: 1195-6, being *Publ.* 25,482 of 49 pp.
- Bud dissections showed that flower buds of *Gardenia grandiflora* are the terminal buds. After apical dominance was destroyed by the formation of a flower bud, differentiation occurred in the lateral bud thus producing a shoot, which would itself produce a terminal flower bud if the short photoperiods suitable for flower initiation were provided. Plants exposed to long photoperiods or to average night temperatures above 70° F. did not initiate flowers. Conditions for flower initiation

were most favourable in autumn, winter and early spring, but the rate of development in these months was slow due to low light intensity. Conditions for flower initiation were less favourable in late spring and summer, but there was a decided increase in the percentage of stem tips that formed flower buds when plants were exposed to short photoperiods from 23 July to 13 August.—Ohio St. Univ.

759. WELLS, J. S.

Modern methods in the propagation of hollies.

Amer. Nurseryman, 1958, **108** (7): 58-63.

Factors affecting the rooting of holly cuttings are summarized from recent experiments and experience. Time of taking the cuttings does not appear to be an important factor provided there is a piece of old wood at the base of the cutting. Wounding and treatment with IBA are beneficial. As a rooting medium a 50: 50 mixture of sharp sand and acid peat is recommended; 80% acid peat+20% perlite is a possible substitute, and for *Ilex crenata* plain sharp sand is preferable. A high level of moisture and air humidity, and therefore good drainage, is essential. Bottom heat of 75°-85° F. is desirable, provided high humidity is maintained. Frames fitted with an intermittent mist unit provide excellent conditions for difficult varieties.

760. PIRINGER, A. A., AND STUART, N. W.

Effects of supplemental light source and length of photoperiod on growth and flowering of hydrangeas in the greenhouse.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 579-84, bibl. 6.

Fluorescent and incandescent lights were compared as sources of supplementary light for 3 commercial hydrangea varieties during summer growth and winter forcing under 12- and 16-hour photoperiods. All three varieties had initiated well-developed flower primordia by the time of cold storage, regardless of light treatment. Primordia of Sainte Therese were the most advanced, although those of plants grown under 16-hour photoperiods were slightly delayed. Flower buds of Todi under the conditions of the experiment failed to develop. Flowers of Merveille were larger under the 16-hour photoperiod, regardless of light source, while flowers of Sainte Therese under the same photoperiod were larger under incandescent than under fluorescent light. Fluorescent light was relatively ineffective when used as a supplementary light source to induce long-day responses of stem length and flower size. Greater stem length due mainly to increased internode length occurred in all varieties where the plants received an additional 8 hours of incandescent light.—U.S.D.A., Beltsville, Md.

761. ASEN, S., AND STUART, N. W.

Effect of low temperature on the free amino acids of dormant *Hydrangea macrophylla* as revealed by paper chromatography.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 563-7, bibl. 16, illus.

Nineteen free amino acids were identified in leaves and terminal buds of Engel's White hydrangea plants entering the rest period or subjected to a rest-breaking low temperature of 4-5° C. for 6 weeks. Low temperatures altered the relative concentrations of some of the acids in both leaves and terminal buds. Tryptophan was not detected in the leaves or terminal buds of plants entering the rest period, but it accumulated in these tissues during low-temperature treatment.—U.S.D.A., Beltsville, Md.

762. SILSBURY, J. H.

Temperature and germination in *Kennedya* Vent.

Nature, 1958, **182**: 954-5, bibl. 1.

The optimum temperature for germination of 4 species of *Kennedya* was found to be between 15° and 20° C., with a sharp decline at 25° C. *K. carinata* and *K. prostrata*, however, also showed spectacular decreases in germination percentage from 15° to 20° C. With *K. carinata* pre-treatment for 5 days at 20° C. before holding at 15° C. had a retarding effect on germination. A temperature of 20° C. did not affect all phases of radicle growth but only its commencement. The time interval between the initiation of radicle growth and the completion of germination at 15° C. was approximately 5 days.—Univ. west. Australia, Nedlands.

763. VON GUTTENBERG, H., AND LEIKE, H.

Untersuchungen über den Wuchs- und Hemmstoffgehalt ruhender und treibender Knospen von *Syringa vulgaris* L. (Investigations on the content of growth promoting and inhibiting substances in dormant and developing buds of lilac.)

Planta, 1958, **52**: 96-120, bibl. 64.

Large amounts of a growth inhibitor were found to be present in lilac buds during autumn and winter. At the end of the dormant period the level started to drop, and this decrease continued until a minimum was reached at the time of most vigorous growth. In sycamore there was a considerable decrease in the bud content of an inhibitor some time before growth began. Large amounts of growth substances were extracted from lilac and sycamore leaves shortly before leaf-fall, and these are considered to be decomposition products. During forced growth the growth substance curve was similar to that of natural growth. The growth inhibitors studied were not tannins.

764. TOOLE, E. H., AND OTHERS.

Action of light on germination of seeds of *Paulownia tomentosa*.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xxiii.

Complete germination of *Paulownia* seeds was obtained after 48 hours' irradiation with white fluorescent light or after 1 hour of light per day for 3 days. Seeds given continuous light for 48 hours could be prevented from germinating by a few minutes exposure to far-red. This effect was reduced by increasing the period of darkness before far-red illumination, and was also reversed by a few minutes exposure to red light.—*Plant Ind. Stat.*, Beltsville, Md.

765. FINE, J. M., AND BARTON, L. V.

Effect of after-ripening on free amino acid content of tree peony seeds.

From abstr. in *Plant Physiol.*, 1958, 33 (Suppl.): xiv.

In tree peony embryos and endosperm large amounts of, and rapid increases in alanine, glutamic acid, glutamine and valine were associated with after-ripening at 5° C. In seedlings which had not been after-ripened asparagine, phenylalanine and tyrosine increased rapidly. No significant differences in the rate of accumulation or in amount attributable to temperature or after-ripening were noted for β -aminobutyric acid, aspartic acid, leucine, serine, lysine or threonine.—Boyce Thompson Inst., N.Y.

766. LANGHANS, R. W., AND LARSON, R. A.

Controlling poinsettia flowering.

Bull. N.Y. St. Flower Grs, 1958, No. 151, pp. 1-3, 5, illus.

In daylengths of 12 hours or more poinsettias remain vegetative, but in New York State dull weather in late Sept. or early Oct. when the natural daylength is 12½–13 hours may result in premature flower bud initiation and the development of flowers too early for the Christmas market. This can be prevented by providing 2 hours of artificial light, at a minimum of 3 f.c., in the middle of the night from 21 Sept. to 10 Oct. After flower bud initiation has occurred daylength continues to exert an effect, and shortening the days to about 9 hours by the use of a black cloth results in shorter and quicker maturing plants. During this period of flower development temperatures, both day and night, also exert an important effect on speed of maturity and quality. In trials the best night temperatures were 60° and 70° F. With the variety Barbara Ecke Supreme the time taken from the start of short days to flowering, at night and day temperatures of 60° and 70°, was 76 days in both natural daylengths and 9-hour daylengths; at temperatures of 60° and 80° it was 66 and 60 days, respectively; and at 70° and 70° it was 60 and 56 days, respectively.

767. DIMOCK, A. W., AND BATEMAN, D. F.

Controlling poinsettia root rot.

Bull. N.Y. St. Flower Grs, 1958, No. 151, pp. 4-5.

Root rot of poinsettias may be caused by any one of 3 fungi, namely *Thielaviopsis basicola*, *Pythium* spp. (notably *P. ultimum*) and *Rhizoctonia solani*. Losses can be kept to a minimum by combining the use of a free-draining potting compost that is steam-sterilized, with the highest practicable temperatures and attention to sanitation. These measures can be supplemented by the application of a Terraclor drench at ½ lb./100 gal. against *Rhizoctonia*, and, on a trial basis, of captan at 1 lb./100 gal. against *Pythium*. No chemical has yet been found effective against *Thielaviopsis*.

768. SHANKS, J. B., AND LINK, C. B.

Cultural factors and the incidence of certain soil-borne diseases of poinsettia.

Proc. Amer. Soc. hort. Sci., 1958, 71: 522-36, bibl. 9, illus.

Thielaviopsis basicola may be satisfactorily controlled by growing poinsettia plants in a soil of pH 4.5–4.8, but plants were more susceptible to *Rhizoctonia solani* and *Pythium* spp. at pH 4.5 than at pH 5.4. There was no evidence of varietal resistance to root rots. Several fungicides were tested for control, and good control of *Rhizoctonia* was obtained with PCNB used as a soil drench. No fungicide gave satisfactory control of *Thielaviopsis* or *Pythium*. Increased plant growth due to the presence of fungi was noted in several cases in which the fungus involved was not pathogenic. [For earlier work see *H.A.*, 26: 2050.]—Univ. Maryland, College Park.

769. MAHLSTEDE, J. P., AND LANA, E. P.

Evaluation of the rooting response of cuttings by the method of ranks.

Proc. Amer. Soc. hort. Sci., 1958, 71: 585-90, bibl. 8.

The visual method of ranks (the assignment of arbitrary index numbers), which has been used to establish differential rooting responses, is described. In tests with *Ligustrum amurense*, rooted with various forms of NAA, the results obtained from 4-group ranking (heavy, medium, light and no rooting) were not radically different from those obtained from weight and length determinations when the differences between treatments were relatively large.—Iowa St. Coll., Ames.

770. SIPOS, E.

Adatok a Magyar *Sorbus*-fajok és változatok faiskolai termesztéséhez. (*Hungarian Sorbus species and varieties in the nursery.*) [Russian and German summaries 1½ pp. each.] *Kert. Kut. Int. Évk.* 1957, 2: 295-339, bibl. 4, illus.

Tabulated results are given of studies on 186 clones, representing at least 40 *Sorbus* species and botanical varieties, grafted on 4 rootstocks. None of the rootstocks was found suitable for all the clones. *Crataegus monogyna* was, in general, the most satisfactory, followed by *Cydonia oblonga*. *Pyrus communis* was suitable only for a few species, and the trees produced were slow growing. *Crataegus nigra* is not recommended as a rootstock for *Sorbus*. The use of *Sorbus* spp. themselves as rootstocks is also being studied.

771. KNOWLES, R. H., AND ZALIK, S.

Effects of temperature treatment and of a native inhibitor on seed dormancy and of cotyledon removal on epicotyl growth in *Viburnum trilobum* Marsh.

Canad. J. Bot., 1958, 36: 561-6, bibl. 7, illus.

Dormancy was encountered in both seeds and seedlings of *Viburnum trilobum* Marsh. When seeds were exposed to germinative conditions at 20° C., dormancy was expressed by slow growth of the radicle and hypocotyl in some seeds, and by lack of germination in others. This type of dormancy was found to be associated with the presence of a water-soluble inhibitor, as well as with a need for an appropriate temperature treatment. Epicotyl dormancy, or failure of shoot growth following seedling emergence, was overcome by the removal of the cotyledons. [Authors' abstract. See also *H.A.*, 28: 752.]—Univ. Alberta, Edmonton.

772. SMITH, B. C.

An investigation of the delayed germination of the seed of *Cotoneaster divaricata*, *C. zabeli*, *Viburnum lantana* and *V. lentago*.

Diss. Abstr., 1958, 18: 771-2, bibl. 1, being *Publ.* 24,510 of 81 pp.

Cleaned seed and freshly harvested fruits were planted on 4 harvest dates at 2-week intervals, beginning on September 23, 1950. Cleaned seed of *Cotoneaster zabeli* gave at least 73% germination when harvested after October 10, while cleaned seed of *Viburnum lantana* reached 90% germination when harvested on October 21. Cleaned seed of both species germinated 17-50% better than seed planted in the fruit when planting was done after October 7. No seed of *C. divaricata* had germinated after 18 months. Seed of *V. lentago* planted in the fruit germinated 4-25% better than cleaned seed at all harvest dates, and reached a maximum of 77% germination when planted on October 7. When the whole fruits of *Cotoneaster* or *Viburnum* were planted, spindly seedlings were produced which were undesirable for transplanting. Seeds of *C. zabeli* harvested after October 21 contained hydrogen cyanide. Embryos from newly-harvested and 1-year-old seeds were also excised. Maximum seedling production with *C. divaricata* (1950 and

1951 harvests) was 77% when 35 embryos were soaked in 1,000 c.c. of tap water for 48 hours. Maximum seedling production (93%) was obtained from *C. zabeli* (1950 harvest) when 35 embryos were soaked in 100 c.c. of tap water for 72 hours. Soaking was often detrimental to embryos of newly-harvested seed. Seedling production from *V. lantana* seed was rather erratic; maximum germination (50%) was reached with newly-harvested seed after soaking in 5 c.c. tap water for 24 hours and 1,000 c.c. for 72 hours. Seedling production from *V. lentago* after soaking was negligible. After stratification of acid-scarified seeds of *C. divaricata* few seedlings were produced. One-year-old acid-scarified seeds of *C. zabeli* produced 90% and 100% seedlings after stratification at 51° F. for 14, 28 and 56 days, while germination with newly-harvested seeds was 63% and 70% after stratification at 51° F. for 14 and 28 days respectively. After seed-coat removal from *Viburnum* seeds, the maximum percentage of seedlings (63%) was produced from 1-year-old *V. lantana* seeds following stratification for 70 days at 40° F. Seedling number produced from newly-harvested seed increased rapidly with each subsequent harvest, reaching a maximum of 83% after 70 days stratification. One-year-old seed of *V. lentago* did not germinate after 14 days stratification at any temperature, but after 56 days at 51° F. 77% germination was obtained. In general, germination of newly-harvested seed was better than that of 1-year-old seed. It was observed that newly-harvested seed exhibited greater antifungal properties than old seed. In aseptic agar cultures of seed parts there was a marked increase in *Cotoneaster* germination after breaking the integument and endosperm, and maximum germination was obtained with excised embryos. Excised embryos of *Viburnum* did not germinate; with newly-harvested seed of *V. lantana*, the waxy coat exerted a slight inhibiting effect, whereas, with *V. lentago*, the entire integument was inhibitory.—Ohio St. Univ.

Noted.

773.

a ABRAHÃO, J., AND MAMPRIM, O. A.

Oídio ou branco da *Gloxinia maculata*. (Oidium or white mould of *Gloxinia maculata*.)

Biológico, 1958, 24: 90-1, bibl. 4.

Symptoms and suggestions on fungicides.

b ANON.

Use of Arbrex at the Royal Botanic Gardens. Kew.

Park Administ., 1958, 28: 199, 201, illus.

Methods of application for hastening the healing of tree wounds.

- c ANON.
Chemical stops fungus in Univ. of Mo. tests.
Amer. Rose Mag., March 1958, summarized in *Flor. Exch.*, 1958, **131** (10): 19.
Actidione applied at 1 p.p.m. after mildew appeared stopped its further development.
- d ATKINSON, B.
Mist propagation technique in South Africa.
Gdnrs' Chron., 1958, **144**: 271.
Tabular results of rooting softwood cuttings of many ornamentals under constant mist in the open.
- e BAKER, K. F.
The development of floricultural pathology in North America.
Plant Dis. Reprtr, 1958, **42**: 997-1010, bibl. 11. A survey.
- f (BAKER, R.)
Carnation disease research and new cultural practices.
Colo. Flower Grs' Ass. Bull., reprinted in *Flor. Exch.*, 1958, **131** (8): 14, 40.
With particular reference to control of *Fusarium roseum* f. *cerealis* and maintenance of healthy mother stocks.
- g BHATNAGAR, G. S.
Studies on the biology of *Jasminum multiflorum* (Burm. F.) Antr. (*J. pubescens* Willd.).
Sci. and Cult., 1957, **22**: 506-9, bibl. 4, illus.
Floral biology of 4 varieties compared.
- h BOKE, N. H.
Areole histogenesis in *Mammillaria lasiocantha*.
Amer. J. Bot., 1958, **45**: 473-9, bibl. 19, illus.
- i BRIERLEY, P., AND TRAVIS, R. V.
A virulent strain of cucumber mosaic virus from Easter lily.
Plant Dis. Reprtr, 1958, **42**: 1034-6, bibl. 2, illus.
Symptoms and transmission.
- j BRIERLEY, P., AND TRAVIS, R. V.
Soil-borne viruses from chrysanthemum and begonia.
Plant Dis. Reprtr, 1958, **42**: 1030-3, bibl. 7, illus.
Some properties and hosts reported.
- k ERNST, E., AND STRITZKE, S.
Die Rose—ein wertvoller Fruchtlieferant. (The rose—a valuable fruit-bearer.)
Dtsch. Gartenb., 1958, **5**: 243-5, bibl. 14, illus.
Vitamin C content of hips of several species.
- l GARTENWELT.
Sondernummer, Schleswig-Holstein. (Special number on Schleswig-Holstein.)
Gartenwelt, 1958, **58**: 291-310, illus.
Including articles on growing begonias, hellebores, lilies-of-the-valley and vegetables.
- m GIANFAGNA, A. J.
How to propagate house plants.
Circ. Pa agric. Ext. Serv. **485**, 1958, pp. 12, illus.
Notes on methods of propagation by seed, division, runners, air-layering, cuttings and grafting.
- n GREEN, P. S.
A monographic revision of *Osmanthus* in Asia and America.
Notes roy. bot. Gdn Edinb., 1958, **22**: 439-542, bibl. numerous, illus.
Including all the species cultivated as ornamentals.
- o HANGER, F.
Camellias and their cultivation.
J. roy. hort. Soc., 1958, **83**: 375-87, illus.
In Great Britain; with list of recommended varieties.
- p HOLDEN, M.
Dry weather grass growing made easy.
Park Administ., 1958, **23**: 168-9.
Growing grass seed through a layer of bitumen.
- q HOLLINGS, M.
Anemone brown ring—a virus disease.
Plant Path., 1958, **7**: 95-8, bibl. 2, illus.
Host range, properties, transmission and serological tests.
- r HOLLINGS, M.
Hydrangea ringspot in Britain.
J. hort. Sci., 1958, **33**: 275-81, bibl. 9, illus.
Symptoms, host range and attempts to inactivate; roguing and sterilization of knives desirable.
- s KOFRANEK, A. M., AND LEISER, A. T.
Chemical defoliation of *Hydrangea macrophylla*, Ser.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 555-62, bibl. 4, illus.
See *H.A.*, 27: 3799 for a preliminary account of this work.
- t KOSAR, W. F.
Performance of grafted Pacific dogwood in the East.
Nat. hort. Mag., 1958, **37**: 177-8, illus.
Cornus nuttalli worked on *C. florida xanthocarpa* promising in first year.
- u KOVÁTS, Z.
A *Tagetes* genus kerti alakjai változékony-ságának vizsgálata, rendszerezése és minősítése. (Studies on, the classification of, and the evaluation of variability in, the garden forms of the genus *Tagetes*.) [Russian and German summaries 2 pp. each.]
Kert. Kut. Int. Évk. 1957, **2**: 151-87, bibl. 4, illus.
Involving 4 varieties of *Tagetes signatus*, 48 of *T. patulus* and 68 of *T. erectus*.

- v KRICKL, M.
Züchtungsversuche über die Möglichkeit einer unbedingten Keimfähigkeit der Samen von *Rosa canina* im ersten Frühjahr. (**Breeding experiments to induce the germination of *Rosa canina* seeds in the first spring.**) [English, French and Spanish summaries about 6 lines each.] *Mitt. Klosterneuburg, Ser. B*, 1958, 8: 189-207, bibl. 4, illus.
Selection in progress.
- w MCQUOWN, F. R.
Grafting flat-jointed cacti. *Gdnrs' Chron.*, 1958, 144: 74, illus.
Method of grafting flat scions on round-stemmed stocks.
- x (MAHLSTEDE, J. P.)
Timing is important when harvesting hollyhocks for storage. *Ia Fm Sci.*, 1958, 13: 70.
Plants best lifted when their moisture content is low.
- y MASTALERZ, J. W.
Day-length and temperature for poinsettias. *Pa Flower Grs' Bull.*, No. 92, reprinted in *Grower*, 1958, 50: 872-3.
Instructions for producing high quality flowers at Christmas.
- z MATHIAS, L. W. H.
A portfolio of snowdrop portraits. *Nat. hort. Mag.*, 1958, 37: 147-64, illus.
17 species and varieties described and illustrated.
774.
a MATSUE, K.
A study on the breeding of Easter lily. (I) Testing parents for hybridization. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1958, 27: 125-34, bibl. 2, illus.
Saga green-stemmed, K2002 and Ace were the best parents.
- b ONGARO, G.
Orcidee sui francobolli. (Orchids on postage stamps.) *Ital. agric.*, 1958, 95: 566-73, illus.
- c PAISLEY, K.
Tradescantia can be sold all the year round. *Grower*, 1958, 50: 915-16, illus.
Culture and propagation of *T. fluminensis* and *Zebrina pendula*.
- d PESCHEL, G.
Die Fusarium- und die Botrytiskrankheit der Gladiöle. (*Fusarium* and *Botrytis* diseases of gladiolus.) *Dtsch. Gartenb.*, 1958, 5: 191-4, bibl. 12, illus.
Control by corm disinfection, preventive sprays, quick drying before storage, and rotations.
- e DE RAVEL D'ESCLAPON, G.
La culture du glaïeul en France. (Gladiolus growing in France.) *Rev. hort. Paris*, 1958, 130: 1916-20, illus.
Commercial culture, chiefly around Vaucluse.
- f REEKER, R.
Der Wasserverbrauch von Pflanzen in Torf. (The water consumption of plants in peat.) *Torfnachrichten*, 1958, 9 (1/2): 2-3.
Potted primulas grown in soil and peat used same amount of water.
- g RICHTER, P.
Arbeitswirtschaftliche Massnahmen beim Anbau von Maiblumen. (Labour-saving methods in growing lily-of-the-valley.) *Dtsch. Gartenb.*, 1958, 5: 218-19, 240-1, illus.
Mechanized culture.
- h SCHÜTTE, H. R., AND BÖHME, H.
Chinasäure als p-Cumarsäure- und Kaffeesäure-Ester in *Antirrhinum majus*. (Quinic acid as the ester of p-coumaric acid and caffeic acid in *Antirrhinum majus*.) [English and French summaries 7 and 8 lines.] *Qual. Plant. Maveg.*, 1958, 3/4: 474-80, bibl. 7.
From pure white flowers; the connexion with flavonoid and anthocyanin formation is discussed.
- i SOPPER, W. E., AND DENNISTON, J. H.
Production and marketing of Christmas trees in central and northeastern Pennsylvania. *Progr. Rep. Pa agric. Exp. Stat.*, 187, 1958, pp. 8.
Data on 5 *Pinus*, 5 *Picea*, 2 *Abies* and 1 *Pseudotsuga* spp.
- j SORDOILLET, R.
Séchage et conservation des bulbes de glaïeuls. (Drying and storage of gladiolus corms.) *Rev. hort. Paris*, 1958, 130: 1924-6, illus.
Recommended temperatures, with a diagram of a store.
- k TEUSCHER, H.
***Trichantha minor*.** *Nat. hort. Mag.*, 1958, 37: 172-4, illus.
A handsome, potential house plant, introduced to Montreal Botanical Garden from Ecuador.

- l WASSCHER, J., VAN DER HELM, G. W., AND VAN SOEST, W.
Enige problemen in de bloementeel. (Some problems of flower growing.) [English summary $\frac{1}{4}$ p.]
Meded. Dir. Tuinb., 1958, **21**: 405-18, illus.
Pros and cons of extending floriculture in Holland discussed.
- m WEBER, C.
Horticulture on postage stamps.
Arnoldia, 1958, **18**: 29-38, illus.
Pleasant, light relief; notes on the many species now depicted.
- n WENHAM, H. T.
***Septoria drummondii* Ell. et Ev., a common seed-borne pathogen in European lines of *Phlox drummondii* Hook. seed imported to New Zealand.**
N.Z. J. agric. Res., 1958, **1**: 486-8, illus.
50% of the lines tested carried viable inoculum, mostly deep inside the seed.
- o WOLTZ, S. S.
Fertilization requirements of gladiolus vary with corm size.
Flor. Exch., 1958, **131** (4): 10, 20-1.
Requirements for N, P, K, Ca, Mg, B, Cu, Fe, Mn and Zn and results of fertilizer trials in Florida reviewed.
- p WYMAN, D.
***Malus* "Dorothea".**
Nat. hort. Mag., 1958, **37**: 174-6, illus.
A chance seedling with semi-double to double flowers and bright yellow fruits.
- q ZAJCEV, G. N.
The importance of seed characters for the taxonomy of the genus *Lonicera*. [Russian.]
Bot. Zhurnal, 1958, **43**: 836-40, bibl. 2, illus.
In many cases seed colour was related to geographic origin.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

See 75, 217j, 355, 629, 988.

Avocadoes.

(See also 16, 858m, u, x.)

775. RICHARDS, S. J., WEEKS, L. V., AND JOHNSTON, J. C.

Effects of irrigation treatments and rates of nitrogen fertilization on young Hass avocado trees. I. Growth response to irrigation.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 292-7, bibl. 7.

Irrigation treatments on young Hass avocado trees were based on readings of tensiometers and of soil moisture resistance blocks. Irrigations applied when the soil moisture tension reached $\frac{1}{2}$ atmosphere resulted in significantly greater vegetative growth (based on measurements of tree height and trunk diameter and on leaf count) than those applied when soil moisture tensions reached 1 and 10 atmospheres. Daily measurement of trunk diameters showed a continuously-increasing growth pattern for the $\frac{1}{2}$ -atmosphere treatment, whereas with the 10-atmosphere treatment there was a period of no growth before summer irrigations.—Univ. Calif., Riverside.

776. MOORE, P. W., AND RICHARDS, S. J.

Effects of irrigation treatments and rates of nitrogen fertilization on young Hass avocado trees. II. Relation to leaf tipburn, tree sunburn, shoot dieback, leaf scorch, leaf color, leaf size, tree vigor, and leaf moisture deficits.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 298-303, bibl. 2.

Young avocado trees were grown at 3 levels of irrigation and at 3 N levels. Leaf tipburn decreased with increasing amounts of N and increased under low soil moisture conditions. Sunburn of shoots and branches was least under the highest irrigation treatment. The dieback of shoot tips after a late summer heat wave was greatest in high N plots and with medium irrigation treatments. Leaf scorch, due to high temperature, was not influenced by N, but was increased by low soil moisture. Leaves became darker green as N and soil moisture increased. Leaf size was not affected by N but increased with increasing soil moisture. Tree vigour was best with the highest level of irrigation, but N had no effect on vigour. Leaf moisture deficits were highest at the lowest irrigation level and lowest at the highest irrigation level.—Univ. Calif., Riverside.

777. (RICHARDS, S. J.)

Avocado irrigation studies.

Calif. Citrogr., 1958, **44**: 40, illus.

In preliminary trials young avocado trees irrigated when the soil moisture tension reached $\frac{1}{2}$ bar [atmosphere] produced an average of 96 fruits weighing 7.4 oz. compared with 55 fruits of the same weight produced by trees irrigated at 1 bar. Trees only irrigated when the tension reached 10 bars produced an average of 25 fruits weighing 5.9 oz. Under the conditions of this experiment these three irrigation rates involved 30 applications per year (totalling 53 surface inches), 19 applications (35 in.) and 11 applications (20 in.) respectively. The trees receiving abundant water showed less tipburn, but more shoot dieback and leaf

scorch than the trees receiving less frequent irrigation.

778. BINGHAM, F. T., AND RICHARDS, S. J.
Effects of irrigation treatments and rates of nitrogen fertilization on young Hass avocado trees. III. Changes in soil chemical properties.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 304-9, bibl. 7.

Irrigation and N management jointly control the level of salinity and nitrate maintained in the soil. Frequent irrigations produce higher chloride levels and lower nitrate levels. In general, total salinity is controlled by the rate of fertilizer application. [Authors' summary.]—Univ. Calif., Riverside.

779. EMBLETON, T. W., AND OTHERS.

Effects of irrigation treatments and rates of nitrogen fertilization on young Hass avocado trees. IV. Macronutrient content of leaves.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 310-14, bibl. 6.

Leaf N % was highest in trees growing in plots where the soil became driest before irrigation. Increased N applications resulted in higher N and Ca contents in the leaves. Where no N was applied, leaf contents of Cl increased as the soil became drier before irrigation. In high irrigation plots rate of N application had little influence on leaf Cl, but in low irrigation plots an increase in applied N resulted in decreased Cl contents.—Univ. Calif., Riverside.

780. LABANAUSKAS, C. K., AND OTHERS.

Effects of irrigation treatments and rates of nitrogen fertilization on young Hass avocado trees. V. Micronutrient content of leaves.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 315-19, bibl. 13.

With an increase in N level, the Zn, Cu and B contents of the leaves decreased. Differential levels of irrigation did not significantly affect micronutrient contents. However, when soil moisture was maintained at a high level by frequent irrigation, Fe and Zn concentrations in the leaves were reduced. Leaves sampled in January 1956 revealed a negative relationship between leaf Zn and frequency of irrigation, but no such relationship was apparent in 1957.—Univ. Calif., Riverside.

781. LABANAUSKAS, C. K., EMBLETON, T. W., AND JONES, W. W.

Influence of soil applications of nitrogen, phosphate, potash, dolomite, and manure on the micronutrient content of avocado leaves.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 285-91, bibl. 21.

Heavy N fertilization significantly reduced the Zn, Cu and B contents of avocado leaves but increased their Mn and Fe contents [see also *H.A.*, 28: 1788]. Heavy P_2O_5 applications reduced leaf Zn and Cu,

increased Mn, and reduced B slightly; the Fe content was not affected [see also *H.A.*, 28: 1789]. K_2O applications increased leaf Cu, but had no effect on Zn, Mn, Fe or B. Dolomite applications increased leaf Cu, reduced Mn, but had no significant effect on Zn, Fe and B. Trees treated with cattle manure contained significantly more Zn, Cu and B in the leaves and significantly less Mn than trees receiving ammonium nitrate. These differences were related to the much lower N content of the leaves of trees that received cattle manure.—Univ. Calif., Riverside.

782. HARKNESS, R. W., LINCOLN, F. B., AND MALCOLM, J. L.

Avocado culture studies.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 340-2.

Alternate bearing. Late picking of Booth 8 avocado fruits continued to produce more alternate bearing than early picking, and the total average yield was also decreased. *Seasonal increase in size and weight of fruit.* During 3 years' measurements of Lula and Booth 7 fruits there was a steady and fairly rapid increase in weight up to October, followed by a very slow increase until January when the fruit was harvested.

783. TAYLOR, O. C., AND OTHERS.

Effect of air-borne reaction products of ozone and 1-N-hexene vapor (synthetic smog) on growth of avocado seedlings.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 320-5, bibl. 10, illus.

Zutano seedlings were fumigated with synthetic smog for 280 hours over a period of 8 weeks to determine the effect on growth. Stem elongation was reduced by 56%, leaf width by 35%, leaf length by 35%, trunk diameter by 21%, total fresh weight of seedlings by 52%, and total dry weight of seedlings by 58%. A characteristic brown discoloration was observed on the lower surface of young expanding leaves after about 70 hours exposure to synthetic smog. Marginal and tip necrosis occurred on leaves of all ages on some of the fumigated seedlings.—Univ. Calif., Riverside.

784. WOLFENBARGER, D. O., AND BARANOWSKI R. M.

Biology and control of insects affecting subtropical fruits. Avocado.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 346-7.

Populations of the scale *Protopulvinaria pyriformis* were reduced by 85-86% after the application of 1½ lb. technical malathion (wetttable powder) 1 lb. technical malathion (emulsion) or 4 oz technical parathion. Reductions in populations of avocado red mite (*Oligonychus yothersi*) were obtained with Kelthane (1 pint of emulsion/10 gal.), a soluble oil (3 quarts/100 gal.), Systo

1 pint of emulsion/100 gal.) and wettable sulphur (10 lb./100 gal.). Avocado fruits, which were fumigated with 10 oz. of ethylene dibromide per 1,000 cu. ft. for 2 hours at 70–80° F., showed more rapid breakdown than non-fumigated fruit. Breakdown was also increased in fruit dipped in ethylene dibromide emulsion.

Citrus—general.

(See also 858d, f, t, 964.)

785. OPHEN, J. D. (Editor).
Livre du IV^{ème} Congrès international de l'Agrumiculture méditerranéenne, Mai 1956.
(Proceedings of the 4th International Congress of Mediterranean Citrus Growers, May 1956.)
Citrus Marketing Board of Israel, Tel Aviv, 1958, 9½ × 6½ in., pp. 604, bibls, illus.

The numerous papers presented at this Congress were either printed in full or summarized under the following group headings: Cultural techniques, Entomology, Commerce, Industry (products and by-products) and Packing (including grading and storage). Abstracts of some of the papers, which describe original work that would not appear to have been published elsewhere, are given below. Other papers, many of which are essentially review articles, deal with such problems as the nutrition and irrigation of citrus in Israel, virus diseases present and not yet present in the Mediterranean area, the adaptability of citrus to drought, and various mite and insect pests and their control. Many problems relating to the handling, transport and marketing of citrus fruits and fruit products are also discussed.

Citrus—varieties, propagation and rootstocks.

(See also 858a, j.)

786. BEÑATENA, H. N.
La mandarina temprana J.I. Improved, su descripción botánica y conveniencia de cultivo. (The early mandarin J.I. Improved, its botanical description and suitability for cultivation.)
Idia, 1958, No. 123, pp. 6-11, illus.

This variety, hitherto grafted mainly on trifoliolate orange, was tested on this and 4 other rootstocks. Growth was slightly more vigorous on rough lemon than on the other rootstocks, but the yield per tree was significantly higher on trifoliolate orange than in the other stocks, particularly on light soil. Yields were very low on sweet orange. Juice content, soluble solids, acidity and vitamin C content are given for the mandarin on all 5 rootstocks.

787. GONZÁLEZ SICILIA, E.
Una nueva variedad de naranjeras. (A new orange variety.)
Livre IV^{ème} Congr. int. Agrumicult. médit. 1956, 1958, pp. 288-91.

A new strain of Cadena, known provisionally as Cadena Z, arose by budding a rootstock [type not stated] with the variety Comuna. Leaf measurements, fruit characteristics and composition are compared for Cadena Z and the typical Cadena. The new strain produces earlier and sweeter fruit than the original, also leaves with longer petioles and shorter blades. Propagation studies are in progress.

788. ZABALA, S.

Propagación de plantas cítricas por medio de estacas. (Propagation of citrus plants by cuttings.)

Idia, 1958, No. 124, pp. 37-40, illus.

Under conditions in Tucumán, Argentina, citrus cuttings between 20 and 30 cm. long were more satisfactory than cuttings of other lengths. Open-air propagation was compared with propagation in pots of coarse sand in a humid greenhouse. The varieties involved were sweet orange, rough lemon, Rangpur lime, Genoa lemon, and Cleopatra mandarin, for the first 3 of which August and February cuttings were compared. Open-air propagation proved satisfactory (over 80%) for rough lemon and Rangpur lime, but not so successful as greenhouse propagation, which gave excellent results (over 90%) with August cuttings of these 2 varieties. August cuttings of sweet orange, however, were only 15% successful in the open, although for corresponding February cuttings rooting was 50%.

789. JAUHARI, O. S., AND RAHMAN, S. F.

Effect of hormones on rooting in cuttings of sweet lime (*Citrus limetoides* Tanaka).

Sci. and Cult., 1958, 23: 615-16.

Best results (37.5% rooting) were obtained by ring-barking the unsevered budwood ¼ in. below suitable buds a fortnight before cutting to induce carbohydrate accumulation. The cuttings were then soaked for 24 hrs in 200 p.p.m. NAA.—Govt. agric. Coll., Kanpur.

790. SHANNON, L. M., AND ZAPHRIR, J.

The relative influence of two citrus rootstock species upon plant growth and upon the inorganic composition of the scion.

Proc. Amer. Soc. hort. Sci., 1958, 71: 257-64, bibl. 31.

In a study of plant growth and the inorganic composition of scion leaves a dwarfing stock, trifoliolate orange, and a vigorous stock, rough lemon, were made to impart their effects simultaneously to a single scion of trifoliolate orange or rough lemon. The scion appeared to exert a greater influence on plant dry weight than did the stock. Both stocks exerted a positive effect on plant growth. There was a direct relationship between the ability of the scion species to accumulate K and Ca and the influence which the species

imparted as a rootstock on the K and Ca content of the scion. This relationship was not apparent in the Fe data. When both rootstocks were grafted under one scion the concentration of K, Ca and Fe in the foliage approached values for scions grown on rough lemon more closely than those for scions on trifoliate orange. Scion influence on K and Ca contents of foliage was stronger than rootstock influence. Scion and rootstock influence on leaf Fe content was nearly equal. [From authors' summary.]—Univ. Calif., Los Angeles.

791. NAURIYAL, J. P., SHANNON, L. M., AND FROLICH, E. F.
Interstock effect on Eureka-trifoliate incompatibility.
Calif. Citrogr., 1958, 43: 366, 386-9, bibl. 8, illus.

Nucellar Eureka lemon scions showed varying degrees of incompatibility when grafted on different strains of trifoliate orange stocks. Incompatibility was more marked on vigorous than on dwarfing strains. Incompatibility did not appear during the 5-year experimental period when a Valencia orange interstock was used. In declining trees starch was present in scion bark, but not in stock bark, thus indicating a phloem girdle. Biochemical studies also revealed a disturbance in the N metabolism, but this seemed to be a result rather than a cause of decline. It is suggested that a substance is produced in the Eureka scion which damages the conducting tissue in the trifoliate orange stock.—Univ. Calif., Los Angeles.

Citrus—soil factors, nutrition and irrigation.

(See also 388.)

792. PATT, J.
Experiments in non-tillage of citrus in the coastal zone of Israel.
Livre IV^{eme} Congr. int. Agrumicult. médit. 1956, 1958, pp. 219-30, bibl. 8.

Two experiments are described. 1. *Shamouti orange on sweet lime stocks in the Ein-Shemer orchard.* The trees were growing in a light to light-medium soil and were irrigated by sprinkler. In a preliminary trial started in 1944 and continued for 3 years clean cultivation was compared with non-tillage, in which weeds were controlled by 3-4 sprayings a year of petroleum oil (Shell Weed-killer No. 2). The results [not given in detail here] indicated that the cessation of tillage was not followed by any set-back to the trees in growth or cropping, and, in fact, their health and fruit quality improved. The 3-4 herbicide applications controlled all the weeds present adequately with the exception of *Cynodon dactylon*. 2. *Marsh grapefruit on sour orange stocks at the Sarafand Station.*

A more detailed experiment was started in 1949 on 15-year-old trees growing in a medium heavy soil. Comparisons were made between tillage by disking and 3 non-tillage treatments, viz. weeds controlled by herbicide sprays, weeds mown and weeds left uncontrolled. Up to the end of the first 6 years none of the treatments had resulted in significant differences in yield or in growth as measured by trunk cross-sectional area. Nor was there any evidence that the non-tillage trees needed more N or irrigation than the cultivated trees.

793. PATT, J.

Effects of old citrus soils on the growth of citrus seedlings.

Livre IV^{eme} Congr. int. Agrumicult. médit. 1956, 1958, pp. 208-15, bibl. 8.

Pot experiments were carried out in 1952 and 1955 in which citrus seedlings of 5 species were grown in light and medium-light soils taken from old citrus groves, from grubbed citrus groves and from comparable non-citrus areas. In the first experiment no fertilizer was applied and in the second a uniform fertilizer application was made to all the seedlings. No root-rot or nematode troubles were encountered. Under these conditions the old citrus soils were not found to exert a depressing effect on the growth of the seedlings, except where these were of the same species as the rootstock in the old orchard.

794. MARTIN, J. P., AND ERVIN, J. O.

Changes in fungus population of California old citrus orchard soils when cropped to orange seedlings in the greenhouse.

Soil Sci., 1958, 86: 152-5, bibl. 4.

Total numbers of fungi increased during cropping in the greenhouse, while the kinds decreased. Certain fungi such as *Fusarium solani*, *Pullularia pullulans*, *Penicillium lilacinum*, *Aspergillus niger*, *A. sydowi*, *A. versicolor*, and *Penicillium restrictum*, which were present in relatively high numbers in the field soils, persisted in similar numbers in the crocks in the greenhouse. Several species, such as *Stysanus stemonites*, *Pyrenochaeta* sp., and *Gliomastix convoluta*, decreased in relative numbers, while *Thielaviopsis basicola* and *Penicillium nigricans* increased. The greatest changes in kinds of fungi in the soil occurred during the second cropping to citrus. *T. basicola* accounted for <1% of the colonies from the field soil and 19% of the fungi after the second crop of seedlings in the greenhouse. [From authors' summary.]—Univ. Calif., Riverside.

795. SMITH, P. F.

Trends in Florida citrus fertilization over the past twenty-five years.

Citrus Mag., 1958, 21 (1): 12, 16-17, 22-3, 27.

The main fertilization trends in Florida over the

past 25 years have been an increase in rate of N fertilization, a marked reduction in the use of P, a change in N/K₂O ratio from 1:2 or 1:3 to 1:1, and the widespread use of minor elements.

796. STEWART, I., LEONARD, C. D., AND DESZYCK, E. J.

Citrus nutrition studies.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 188-92, illus.

Gibberellic acid. The growth of grapefruit, sweet orange and rough lemon seedlings was greatly stimulated by leaf sprays of GA. Little or no effects of GA were observed from soaking buds before insertion, spraying buds after union or soaking seed before germination. **Chelated iron on calcareous soils.** Trees treated with iron ethylene-bis (alpha-amino-2-hydroxy phenyl acetate) at the rate of 20, 30 or 50 g. Fe were completely green 10 weeks after treatment, and their leaves contained 68-73 p.p.m. Fe. **Effect of lead arsenate, borax and fertilizer rates on Marsh grapefruit.** The average yield of unsprayed trees was 12.5 boxes per tree per year compared with 10.5 boxes for trees sprayed with 3 lb. lead arsenate per 100 gal. An annual borax application at 1 lb. per 100 gal. reduced yield by 0.6 box. Trees given 50 lb. of a 8-0-7-6 fertilizer per tree produced 12 boxes, which was 0.75 box more than was given by trees that received 30-39 lb. Arsenic sprays reduced fruit number per tree by 20%, but fruit number on the borax-sprayed trees was increased by 5%. There were no significant changes in average fruit diameter. The amount of dead wood prunings was lower from arsenic sprayed trees than from unsprayed trees.

797. KOO, R. C. [J.].

Quality of citrus fruits as related to mineral composition of the whole fruit and subtending leaves.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 224-5.

Studies with Valencia orange indicate that N was the only element that could be directly related to fruit production. P, K and Mg in the amounts used did not appear to limit fruit production directly, but P and K may have had secondary effects. Fruit production in groves with inadequate moisture was somewhat curtailed by oil sprays in comparison to parathion sprays. Among the mineral elements used in fertilizers, N usage was reflected in leaf N content, P usage was reflected in the P content of the fruit and in the available P in the topsoil layer (0-6 in.), but K usage was not reflected in leaf or fruit K contents, except when considered from the standpoint of the N:K ratio. Water-soluble Mg in the fertilizer was not reflected in the Mg contents of fruit, leaf or soil. Soil pH was related to the exchangeable Mg or Ca contents

of the soil, according to whether dolomite or calcium limestone was used.

798. HEYMANN-HERSCHBERG, L.

Micronutrient deficiencies of citrus in Israel.

Livre IV^{eme} Congr. int. Agrumicult. médit., 1956, 1958, pp. 191-6, bibl. 9.

Deficiencies of Zn, Mg, Mn, Fe and B and excess of B have been diagnosed in Israeli groves by external symptoms and by leaf analyses. Groves planted on light and calcareous soils are most commonly affected, especially where the trees have received excessive irrigation. Zn and Mg deficiencies are the most prevalent troubles and need corrective measures. Mn and B deficiencies, on the other hand, are not at present considered serious enough to warrant corrective measures. Zn deficiency can be cured by treatment in spring or early summer with a neutralized zinc sulphate spray (2% ZnSO₄, 1% lime and a spreader) or a zinc oxide dust, both combined, if necessary, with sulphur treatments used against rust mites [see *H.A.*, 26:4055]. In Mg-deficient groves good results have been obtained with 4% MgSO₄ sprays applied alone or in combination with Fe, Zn, Cu and Mn compounds. A dust mixture of 80% MgSO₄ and 20% talcum has also shown promise. Lime-induced chlorosis associated with Fe deficiency can generally be overcome by reducing irrigation.

799. DIKSHIT, N. N.

Preliminary studies on citrus die-back in Coorg—II. Effect of micro-element sprays and irrigation on the occurrence of chlorosis.

Sci. and Cult., 1958, 24: 91-4, bibl. 5.

Three levels of irrigation—nil, weekly and fortnightly—and sprays of Zn, Fe, Mn, Mg, Cu, B and Mo were applied to seedling mandarins suffering from chlorosis. Irrigation tended to increase the number of growth flushes. Sprays of Zn, Cu, Mg and Mo tended to reduce chlorosis, Zn and Cu significantly so during the July to December period.

800. RASMUSSEN, G. K., AND SMITH, P. F.

Effect of fertilizer rate, rootstock, and leaf age on the level of sulfur in citrus leaves.

Proc. Amer. Soc. hort. Sci., 1958, 71: 241-7, bibl. 20.

Leaf age had only a minor effect on S concentration, although there was a tendency for the S concentration to be higher in young leaf tissue. Rootstock had the greatest effect on leaf S, and most stocks absorbed relatively little SO₄. Grapefruit stock, however, was relatively efficient in absorbing SO₄, and the foliage of scions on it contained 2-3 times as much S as on other stocks. Leaf S also differed among scion varieties. Sulphate level in the nutrient substrate was reflected in the

leaf content of sweet orange seedlings. The cation carrier of SO_4 sometimes affected SO_4 absorption. No competition for absorption by nitrate, phosphate or borate anions was indicated. In general, the use of relatively large amounts of S in commercial citrus culture is not harmful to the trees.—U.S.D.A., Orlando, Fla.

Citrus—growth and fruiting.

803. ITO, H., FUJITA, K., AND OGAKI, T.
Investigations on the cause and control of alternate bearing of Unshiu orange trees (I). The time of blossom-bud differentiation. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1958, **27**: 94-100, bibl. 18, illus.

Blossom-bud differentiation in Unshiu trees was first seen in material collected on March 22, 1956, and later on March 23, 1957, following the start of meristematic activity. Shoot defoliation had no effect on time of differentiation. In Navel oranges flower differentiation was apparent in material collected on January 21, following meristematic activity observed on January 10.

804. MOORE, P. W.
Mechanical pruning for citrus. *Calif. Agric.*, 1958, **12** (11): 7-9, 13, illus., and *Calif. Citrogr.*, 1958, **43**: 400, 410-15.

During 3 years' trials of mechanical pruning yields from lemon trees were higher, even with severe hedging, than those from hand-pruned lemon trees; other advantages of mechanical pruning were a 20% reduction in the spray gallonage used, easier picking and easier lighting of heaters. In one orchard hand pruning was done at the end of 3 years to remove accumulated dead brush, thin out the tops and reduce height. With oranges light mechanical hedging did not reduce the crop, but yield losses were marked with moderate and severe hedging. Hedging on all 4 sides has generally resulted in a loss of crop in the first season in direct proportion to the severity of cutting, but in a few cases crops were the same as those from unpruned trees. Tree recovery became apparent in the second crop from pruning. Hedging from February to mid-August has been followed by satisfactory recovery. No results have yet been obtained following the topping of orange and grapefruit trees.

805. COGGINS, C. W., JR., AND HIELD, H. Z.
Gibberellin on orange fruit. *Calif. Agric.*, 1958, **12** (9): 11.

In early November fruits of Thompson Improved Navel orange (2.5-2.6 in. in diameter), together with their subtending leaves, were dipped in solutions of potassium gibberellate, containing 500, 1,000 or 2,000 p.p.m. of technical gibberellin. The colour of similar but untreated fruits was markedly better than that of the treated fruits at harvest in January and March. Gibberellin treatment increased the percentage of juice and significantly increased the ascorbic acid content at both harvest dates, and increased the juice pH at the January harvest. Smoother rinds resulted from gibberellin treatment. At the January harvest only fruits dipped in 2,000 p.p.m. appeared to have

801. HARDING, R. B., MILLER, M. P., AND FIREMAN, M.

Absorption of salts by citrus leaves during sprinkling with water suitable for surface irrigation.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 248-56, bibl. 12, illus.

Grapefruit, tangerine, Valencia and Navel orange trees wetted by sprinkler-applied water were able to absorb sufficient Na and Cl during an irrigation season to cause leaf burn and defoliation. Where foliar absorption of Na and Cl has been found to occur the amounts of Na in irrigation waters has ranged from 69 to 190 p.p.m. and Cl from 36 to 131 p.p.m., with total dissolved salts ranging from 500 to 900 p.p.m. In the orchards investigated soil salinity has not been a problem so far.—Univ. Calif., Riverside.

802. COOPER, W. C., PEYNADO, A., AND OLSON, E. O.

Response of grapefruit on two rootstocks to calcium additions to high-sodium boron-contaminated, and saline irrigation water.

Soil Sci., 1958, **86**: 180-9, bibl. 13.

Young Webb Red Blush grapefruit trees on sour orange and Cleopatra mandarin rootstocks were irrigated for a 4-year period with a saline high-Na water contaminated with B, to which were added known levels of calcium nitrate, calcium sulphate or ammonium nitrate. Observations were made on growth and on B and salt toxicity, and chemical analyses were made of the leaves and roots for contents of Na, K, Ca, Mg, chloride, sulphate, N and B. There was an appreciable influence of treatment and rootstock on growth and on salt and B toxicity. The trees on sour orange rootstock were less tolerant to the saline well water than were trees on Cleopatra mandarin. There were no definite symptoms of either chloride, Na or sulphate toxicity, although there was an appreciable accumulation of these ions. B-toxicity symptoms were quite apparent and were lessened by the addition to the well water of calcium nitrate, which reduced B accumulation. There was, however, no evidence that B toxicity was a primary factor in the decline of the trees on sour orange rootstock. It was not possible to distinguish clearly the mechanism underlying all of the toxic effects of the saline well water. [From authors' summary.]—U.S. Dep. Agric., Weslaco, Tex.

thinner rinds than control fruits, but by March thinner rinds occurred with all the GA treatments. Significant differences were not detected in fruit drop, puffiness, weight or shape of oranges, percent soluble solids in the juice and the soluble solids/acid ratio.

Citrus—climatic factors.

806. BROOKS, F. A., AND SCHULTZ, H. B.

Orchard heating effectiveness.

Calif. Agric., 1958, 12(8): 4-5, 13.

Tests of 4 heater types in an orange orchard showed that the most efficient was the perforated drum, coke heater, which has a strong radiation output, mostly horizontally. Multiplication of wind machines resulted in more acres being protected per machine than occurred with isolated machines, and examples of spacing are given. Heater support is needed more often with small than with large machines. In combination systems, wind machines alone often give adequate protection and heater-hours of support are in general less than one-sixth of those needed when heaters are used alone.

807. SPERONI, H. A.

La erosión eólica en Corrientes. Sus efectos en las plantas cítricas. (*Wind erosion in Corrientes. Its effects on citrus trees.*)

Idia, 1958, No. 123, pp. 12-13, illus.

Citrus trees in this region of Argentina are severely damaged by hot sand blown by high winds. The erosion is controlled to a large extent where strips of natural vegetation are left between the rows of trees at right angles to the sand drift, but the great disadvantage is the formation of gullies between the rows and consequent accumulation of water during heavy rains. A more practical solution is the planting of a strip of sugar cane for each 10 rows of citrus. This does not result in an undulating soil surface.

Citrus—diseases and pests.

(See also 286, 287, 441, 858e, g-i, o, p, r, v.)

808. OLSON, E. O.

Responses of lime and sour orange seedlings and four scion-rootstock combinations to infection by strains of the tristeza virus.

Phytopathology, 1958, 48: 454-9, bibl. 19.

Citrus plants grown under greenhouse conditions were inoculated with buds from 8 tristeza-infected citrus trees of different varieties introduced into Texas before 1943. Buds from 1 source tree caused severe tristeza symptoms on lime seedlings; buds from 7 sources caused mild symptoms. Some citrus strains with mild effects on lime seedlings caused stunting of sour orange seedlings; others did not. The response of tristeza-infected Valencia orange and Red Blush grapefruit trees on sour

orange and Cleopatra mandarin rootstock varied with rootstock and strain of tristeza virus. Prior infection of lime seedlings by mild strains from 6 sources did not inhibit development of severe symptoms from infection with a severe strain, whereas a mild strain from 1 Meyer lemon tree did. When lime scions carrying the mild strain of virus from this Meyer lemon source were grafted on lime seedlings carrying the severe strain, the growth from the scion showed no recognizable severe symptoms during a 20-month period of observation. However, some lime seedlings inoculated by tissue from the tops of the grafted plants showed severe symptoms. When lime seedlings were inoculated simultaneously with mild and severe strains of tristeza virus, the position of the inoculum buds and the source of the mild strain affected the occurrence of severe symptoms. [Author's summary.]—Citrus Rootstock Invest., U.S. Dep. Agric., and Texas agric. Exp. Stat., Weslaco.

809. FERNÁNDEZ VALIELA, M. V.

Tristeza de los citrus en Tucumán. (*Tristeza of citrus in Tucumán.*)

Idia, 1958, No. 124, pp. 34-7, bibl. 2, illus.

Lue Gim Gong orange suffering from tristeza grew normally when budded on Cleopatra mandarin or Rangpur lime rootstocks, but both bud and roots failed when sour orange was used as rootstock. The Tucumán Experimental Station is studying tolerant rootstocks.

810. TRIPPI, V. S., AND MESÍAS, J. R.

Algunas diferencias bioquímicas y fisiológicas entre plantas sanas y presumiblemente enfermas con tristeza en citrus. (*Some biochemical and physiological differences between healthy citrus plants and those apparently suffering from tristeza.*) [English summary $\frac{1}{4}$ p.]

Rev. industr. agríc. Tucumán, 1957, 41(2): 29-32, bibl. 6.

Investigations were carried out on leaves of Ruby Blood [orange?] grafted on sour orange. The incidence of tristeza reduced reserves of carbohydrates and nitrogen, chlorophyll content, respiration, and catalase and amylase activities. It increased carotene and xanthophyll contents, and oxidase and peroxidase activities.

811. TANG, C.-Y.

The epidermal structure of citrus in relation to its susceptibility to canker infection.

Acta phytopath. sin., 1958, 4: 56-70, bibl. 19, illus.

Leaves, shoots and fruits have proved most susceptible to infection by *Xanthomonas citri* at the stage when new stomata and lenticels are in process of formation. The relative susceptibility of 4 species was found to be correlated with the density and size of their stomata and occurred in the follow-

ing descending order: *C. sinensis*, *C. aurantium*, *C. limon* and *Poncirus trifoliata*.

812. KLOTZ, L. J., DEWOLFE, T. A., AND WONG, P.-P.

Controlling *Phytophthora* root rot of citrus.
Calif. Citrogr., 1958, 43: 390-2, illus.

The latest recommended control measures include the hot-water treatment of seeds at 120°-125° F. for 4 min. and of the root systems of young trees worked on sour orange at 113°, 116° or 119° F. for 25, 10 and 5 min. respectively, the fumigation of orchard sites 1 month before planting with Vapam or Mylone, the disinfection of contaminated irrigation water with copper sulphate and the use of resistant trifoliate rootstocks. [See also *H.A.*, 28: 1811.]

813. GRIFFITHS, J. T., AND THOMPSON, W. L.
Insects and mites found on Florida citrus.
Bull. Fla agric. Exp. Stats 591, 1957, pp. 98, bibl. 61, illus., [received 1958].

This liberally illustrated bulletin is designed to help citrus growers to recognize the insects and mites which cause injury or which are beneficial. Particular attention is paid to scale insects and to rust and spider mites. Details of control measures are not included, and for these the grower is referred to the spray schedule which is included in "The better fruit program" published annually by the University of Florida.

814. KING, J. R.
Control of citrus insects and mites in the Indian River area.
A.R. Fla agric. Exp. Stats, 1956-57, pp. 204-7.

Annual sprays of oil or parathion gave better control of purple scale, with higher fruit production of better appearance, when applied between November and April than during the summer. The best results, however, were obtained by 2 annual applications of parathion made at post-blossom (April) and in the summer (July). Satisfactory control of purple scale, purple mite and rust mite was obtained by a programme comprising a post-blossom spray of parathion plus wettable sulphur, a fungicide and a nutrient spray material, a November spray of parathion plus DN Dry Mix and wettable sulphur, and an additional July spray of wettable sulphur. Granular formulations of heptachlor, dieldrin and chlordane have shown promise against the Fuller rose weevil (*Pantomorus godmani*) and the blue-green citrus weevil (*Pachnaeus litus*). Fungicides known to be effective for greasy spot control reduced lesions better when applied in July-September than when applied at other seasons. Copper at 0.5 lb. was the best of 3 materials for preventing the development of greasy spot lesions; ziram was less effective and captan the least effective.

815. VERGANI, A. R., and RODRÍGUEZ PUJOL, A.
Posibilidad del empleo del Metasystox en citricultura. (Possibility of using Metasystox in citrus growing.)
Idia, 1958, No. 123, pp. 14-16.

Metasystox sprayed at 0.1% gave rapid and complete control of aphids (*Toxoptera aurantii*) in a heavy infestation on lemon trees. The action was slower, but equally effective, at 0.05%. At 0.125% the mortality figures for red scale (*Aonidiella aurantii*) after 14 days were 88% on branches, 63% on leaves and 14.6% on fruits, but almost complete control of this pest resulted from applying the undiluted insecticide with a brush as a 20 cm. band round the trunk, though the mite *Brevipalpus pseudocuneatus* was unaffected. Trunk application, however, produced serious toxicity symptoms in some trees of Lue Gim Gong orange and wilting or yellowing in some types of mandarin and in Valencia orange, but did no visible damage to Marsh Seedless grapefruit or Washington Navel orange. Repeating the treatment 45 days later caused defoliation or death in sensitive varieties and damage to the bark and phloem in all cases.

816. GEORGHIOU, G. P.
Contribution to the control of the Mediterranean fruit fly (*Ceratitis capitata*, Wied.) on oranges with dieldrin and poisoned bait sprays.
Livre IV^{eme} Congr. int. Agrumicult. médit. 1956, 1958, pp. 315-39, bibl. 21.

Experiments were carried out in Cyprus in 1955 in 8 Shamouti orange groves to compare the effects of 0.1% dieldrin cover sprays applied at about 600 gal./acre and of bait sprays, composed initially of 0.5% malathion and 5% sugar and later of 1.0% malathion and 10% sugar, applied at 5 gal. acre. Treatments were started in late Sept.-early Oct., which coincided with the start of oviposition by the fruit flies. A second application of dieldrin was made in some cases early in November. Bait sprays were repeated when trapping records showed fly populations to be increasing, and in most cases this involved making 4 applications. The first dieldrin spray reduced fly populations markedly; in all cases, the reductions persisting for 32-48 days in heavily infested groves and up to harvest (60 days) in lightly infested groves. Fruit harvested from dieldrin-treated trees in November showed 0.38% infestation compared with 4.66% in fruit from untreated controls; comparable figures for fruit harvested in February were 1.32-2.08% compared with 16.91-18.05%. The bait sprays also reduced infestation, but the periods during which they remained effective varied and were much affected by rain and atmospheric humidity. [For practical recommendations on the use of bait sprays see *H.A.*, 26: 2104.] Preliminary trials indicated that the attractiveness of the bait

to the fruit flies could be increased nearly 5-fold by the inclusion of a locally-produced brewers' yeast which contains partially hydrolysed proteins.

817. PLANES GARCÍA, S.

Estudios sobre la ecología de la *Ceratitis capitata* en la zona naranjera del Levante español y nuevo procedimiento de lucha contra la misma. (Studies on the ecology of *Ceratitis capitata* in the orange-growing region of the Spanish Levant, and new procedures for its control.)

Livre IV^{ème} Congr. int. Agrumicult. médit. 1956, 1958, pp. 346-64, illus.

Compulsory control measures introduced in 1955 very markedly reduced infestation. Evidence has been collected from baiting experiments on citrus to show that malathion and Dipterex were highly effective. The addition of sugar to baits was essential, but ammonium phosphate greatly reduced the efficiency of sugar-insecticide mixtures. Treatments were effective for 10-15 days. Lindane, DDT and Diazinon were not effective in baits. Results of similar studies on peach trees will be published later.

818. TOSCANI, H. A.

Ensayos de control de *Ceratitis capitata* (mosca del Mediterráneo) en el Delta del Paraná. (Experiments on control of *Ceratitis capitata* (the Mediterranean fruit fly) in the Paraná Delta.)

Idia, 1958, No. 123, pp. 29-32.

Orchard tests with grapefruit 3 treatments at 5- to 30-day intervals with 50%-active Marlate at 0.3% gave excellent control. Moderately good results were given by 25%-active dieldrin at 0.3% and by 32.8%-active heptachlor at 0.45%. In laboratory tests heptachlor was far more rapid in action than chlordane or Marlate. Soil treatment with heptachlor or Marlate failed to kill the pupae.

819. TURICA, A., AND MALLO, R. G.

Posibilidades de combinar el control químico y el biológico en la lucha contra las moscas de la fruta. (Possibilities of combining chemical and biological control in combating fruit flies.)

Idia, 1958, No. 123, pp. 24-9.

The chief natural enemies of *Anastrepha* spp. and *Ceratitis capitata* are named. The latter pest was successfully controlled in an experiment in Buenos Aires province by spraying citrus trees with poisoned bait consisting of 270 c.c. each of hydrolysed protein and malathion in 100 l. of water. Experiences with other poison baits in various countries are mentioned. Certain protein baits appear to be selective and thus involve less risk of eliminating the insect predators and parasites of

C. capitata. Sugar baits have the disadvantage of inducing the growth of sooty mould.

820. (GEORGALA, M. B.)

An improved bait formula for better fruit fly kill.

Citrus Gr, 1958, No. 295, pp. 1-2.

Provisional recommendations are given for the use of a protein attractant, known as Staley's Sauce No. 7, against the Natal and Mediterranean fruit flies. These are: September to May, Staley's Sauce No. 7, 2 pints; June to July/August, Staley's Sauce No. 7, 2½ pints plus 2 lb. malathion 25% in 100 gal. water. From the end of January until harvest the bait should be applied once a week to alternate rows and every 10-14 days thereafter. The method of application should be similar to that used for sugar baits.

821. JOHNSON, R. B., KING, J. R., AND THOMPSON W. L.

[Chemical control of mites damaging citrus.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 218-20.

Citrus red mite. An air-milled formulation of Tordon 25% wettable powder gave by far the best control. Dosages of ½ and 1 lb. per 100 gal. were the most satisfactory. *Texas citrus mite*. Formulations of Aramite, Systox, Hercules 528, Kelthane, Niagara 1240, Tedion, Union Carbide Chemicals Company 8305, Trithion and wettable sulphur all gave good results. *Rust mite*. Wettable sulphur, Trithion, Niagara 1240, Hercules 528 and Chlorobenzilate gave satisfactory control, while Aramite, Systox, Tedion and Union Carbide Chemicals Company treatments were ineffective. The application of 1 lb. per 100 gal. 65% zineb reduced mite infestation from 31% to 1% within 48 hours of treatment. [See also H.A., 28: 2989 and 2990.]

822. WEDDING, R. T., RIEHL, L. A., AND JEPSON, L. R.

Red mite on citrus.

Calif. Agric., 1958, 12(8): 9-10, 12, illus.

In mite-damaged lemon leaves there was an initial reduction in the rates of photosynthesis and transpiration, followed by a recovery after about 5 months. Transpiration measurements of mite-damaged leaves showed no effect of mite feeding on tangerines, but with limes and grapefruit transpiration was depressed for at least a month. Transpiration measurements on orange leaves during mite feeding showed a considerable stimulation at first, followed by a decline until, by the end of a week, transpiration was appreciably inhibited. Measurements of juice quality factors in lemons showed no significant effects of mite damage. On young and vigorous trees mite infestation did not appear to reduce production.

823. THOMPSON, W. L., AND JOHNSON, R. B.
Chemical control of scales and related insects infesting citrus.
A.R. Fla agric. Exp. Stats, 1956-57, pp. 217-18.

In a comparison between highly refined oils at concentrations between 0.7% and 1% and less highly-refined oils at 1.3%, control of purple and red scale was in proportion to the amount of oil applied. In timing trials the most effective control of both scales followed the application on May 8 and on July 12 of 1.3% oil or 0.7% oil plus 1 lb. of parathion. Two pints of Thimet per 100 gal. were more effective than 1 pint. The phosphatic material 12008 was effective for scale control, but Trithion 25% wettable powder at 1, 2 or 3 lb. per 100 gal. was not effective. In experiments on the effect of timing of oil sprays on tangerine grades, higher grades were obtained when a 1% oil was sprayed on June 15, June 29 or July 19 than when it was applied in August and September. The highest percentage of first-grade fruit was obtained after a July 19 application of 1.7 lb. of parathion. In tests in a pink grapefruit grove the most effective programme for greasy spot control was a post-blossom copper spray, followed in July with either copper-parathion-wettable sulphur or an oil spray; the July copper-parathion spray did not result in an increase in mite and scale populations [see also *H.A.*, 27: 2792].

824. MARICONI, F. A. M.

A cochonilha virgula, coccídeo mais prejudicial à laranjeira. (**Purple scale, the most serious scale pest of citrus.**) [English summary 13 lines.]

Biológico, 1958, **24**: 95-103, bibl. 10, illus.

Although nymphs of *Mytilococcus* [*Lepidosaphes*] *beckii* are controlled by mineral oil sprays, the adult females are very resistant. Mineral oil, malathion, Meta-systox, oil + malathion and oil + Meta-systox were tested in the field against adult females on orange trees, 2 sprays being applied. Only 1% mineral oil + 0.15% malathion gave good control. None of the treatments caused any damage to the orange trees, but the predator *Pentilia egena* was almost completely eliminated after the first spray application.

825. VERGANI, A. R.

Influencia de las lluvias en el desarrollo de la cochinilla roja australiana. (**Influence of rainfall on the development of citrus red scale.**)

Idia, 1958, No. 123, pp. 39-40.

Under the climatic conditions of N.E. Argentina, citrus trees should be sprayed in January and February, i.e. before the autumn rains encourage a build-up of red scale infestation. Even in very dry weather the trees need not be damaged, provided that the soil has been cultivated in such a way

as to conserve moisture, and provided that mineral oils are not used under drought conditions.

826. VERGANI, A. R.

Uso del malathion en citricultura. (**Use of malathion in citrus growing.**)

Idia, 1958, No. 123, pp. 21-3.

Experiments with different formulations of malathion against citrus red scale (*Aonidiella aurantii*) led to the recommendation to use either the 25% w.p. at 0.6-0.7% with 0.3% of oil, or the 50% e.c. at not less than 0.35% with the same addition of oil. The costs of these treatments are compared with those for parathion, E605 and oil alone. Under local conditions (N.E. Argentina) oil is recommended for late December to February. Malathion was also effective against certain mites, notably *Anychus* spp., but not against *Brevipalpus* spp.

827. RIEHL, L. A., AND OTHERS.

Effect of a California spray oil on transpiration of citrus.

J. econ. Ent., 1958, **51**: 317-20, bibl. 9.

A representative California foliage spray oil used for citrus pest control was applied to Eureka lemon, Bearss lime and navel and Valencia orange plants grown in pots in a glasshouse. Temperatures were controlled to give extremes of 66° and 92° F. On the first day after the application of 1.75% spray oil in aqueous mixture transpiration of the sprayed plants was reduced to one-third that of untreated plants. The sprayed plants recovered with time, and analyses showed that the correlation with the log 10 of time is highly significant. The available evidence indicates that reduction in transpiration in citrus foliage after the application of oil spray is due to physical interference by the spray oil on or in the leaf tissue and that recovery of transpiration occurs with dissipation of oil from the leaves. Transpiration was restored to original levels in the oil-sprayed plants in 3 to 5 weeks after the spray was applied. [From authors' abstract.]—Univ. Calif., Riverside.

Citrus—fruit composition, handling and storage.

(See also 858b, 1, 979.)

828. TING, S. V., SITES, J. W., AND DESZYCK, E. J.
Measuring the internal color of Florida red and pink grapefruit with the Hunter Color and Color Difference Meter.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 265-70, bibl. 4.

The Hunter Color and Color Difference Meter was adapted to the measurement of internal color of Ruby Red and Pink Thompson grapefruit. Fruits of the two varieties on rough lemon rootstock were significantly higher in flesh color than

were those on sour orange. Size of fruit and age of tree also influenced the color. There was a decrease in the Hunter "a" value and a slight increase of the "R_d" and "b" values with season. Fruits of Ruby Red variety on rough lemon from various localities showed significant differences in flesh color. [Authors' summary.]—Fla Citrus Exp. Stat., Lake Alfred.

829. TING, S. V., AND DESZYCK, E. J.
The internal color and carotenoid pigments of Florida red and pink grapefruit.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 271-7, bibl. 8.

Fruit was obtained from 6 groves each of Ruby Red and Thompson Pink grapefruit. In 3 of the groves in each case the rootstock was rough lemon and in the other 3 sour orange. Colour of the fruit cross section was measured with a Hunter Color and Color Difference Meter and pigments were determined chromatographically. There was a consistent decrease in colour and in lycopene content with season in both varieties. The beta-carotene increased during the same period. Ruby Red fruit had considerably more colour and higher contents of both lycopene and beta-carotene than Thompson Pink. Sour orange rootstock produced fruits lower in colour and lycopene, but higher in beta-carotene, than did rough lemon rootstock. There was a much closer correlation between the Hunter a : b ratio and lycopene alone than between that ratio and the lycopene : beta-carotene ratio. Lycopene seemed to be primarily responsible for the red colour of the fruit.—Fla Citrus Exp. Stat., Lake Alfred.

830. SPOON, W.
Pompelmoes schil-olie. (Grapefruit peel oil.)
Pharmaceut. Weekbl., 1958, **93**: 15-19, from *Biol. Abstr.*, Sect. D, 1958, **32**, Abstr. 28,437.

The yield of oil obtained by steam distillation from fresh grapefruit amounted to about 0.8% of the weight of the peel and 0.05% of the weight of the whole fruit. The physical and chemical properties of this oil and of 8 other citrus oils are given.

831. PICO, P. S.
Contenido correlativo de esencia, azúcar y acidez de la mandarina común de Concordia en distintos períodos de madurez. (Relative contents of essential oil, sugar and acid in the common mandarin of Concordia at different stages of maturity.)

Idia, 1958, No. 123, pp. 33-9, bibl. 5, illus. Fruit size, weight, juice content, acidity, soluble solids content, sugar and essential-oil content are given for 13 dates over a period of 6 months, and methods of determining acidity, total sugars and essential oils are described. The larger the fruit, the lower was the essential-oil content.

832. SINCLAIR, W. B., AND JOLLIFFE, V. A.
Changes in pectic constituents of Valencia oranges during growth and development.
Bot. Gaz., 1958, **119**: 217-23, bibl. 14.

Seasonal changes in concentrations of pectic substances in peel, pulp, and juice of Valencia oranges were followed by determining the total and the water-soluble pectic substances as anhydro-galacturonic acid during growth and development under normal conditions. After a tremendous initial increase in the total pectic substance in peel and pulp, there is a gradual decrease throughout the remainder of the season. The water-soluble pectins of both peel and pulp also show a gradual decline, but, when observed in relation to the total pectic substances of the corresponding component, the percentage is found to increase in the peel and decline in the pulp before eventually increasing also. The pectic substances found in the juice remain relatively constant throughout. [From authors' summary]—Univ. Calif., Riverside.

833. CHANDLER, B. V.
Anthocyanins of blood oranges.
Nature, 1958, **182**: 933, bibl. 8.

Evidence is presented to show that cyanidin-3-glucoside is the major pigment of the Moro variety, and that a second pigment, probably delphinidin-3-glucoside, is a minor component.—Univ. Calif., Berkeley.

834. EPHRAIM, A., AND MONSELISE, J. J.
Composition of bitter oranges grown in Israel. II.
Bull. Res. Coun. Israel, Sect. C, 1957, **6C**: 43-6, bibl. 4.

Analyses, given in detail, showed that fruit of the 1956 crop had substantially the same composition as that of the 1955 crop [*H.A.*, 26: 3096]. In 1956 the aldehyde content of the oil was lower, the total sugars/invert sugar ratio higher and the acidity and ascorbic acid content of the juice lower than in 1955. About 70% of the pectin in the peel was extracted and its jelly grade strength was found to be 234°.—Lab. Assis Ltd., Ramat Gan. J.R.L.

835. GRIERSON, W., AND KOO, R. C. J.
Peel injury of tangerines as influenced by water relations in the grove and subsequent handling practices.
Citrus Mag., 1958, **21**(2): 8-10, bibl. 7, illus.

A distinctive peel injury (zebra skin) developed in tangerines as a result of high soil moisture levels in the grove before picking, when this was followed by ethylene degreening. Tangerine peel was so sensitive after this combination of circumstances that normal packing house handling, particularly polishing, resulted in peel collapse. To prevent this form of injury it is recommended to reduce irrigation before harvesting, to spot pick for colour,

to reduce ethylene degreening and to have little or no polishing in the packing house.—*Fla Citrus Exp. Stat.*, Lake Alfred.

836. HOPKINS, E. F., AND MCCORNACK, A. A.
Prevention of rind breakdown in oranges.
Citrus Mag., 1958, 21(3): 18-23, 25, bibl. 11, illus.

The development of stem-end rind breakdown in oranges was greatly accelerated during degreening by a high rate of airflow and low relative humidity, which increased fruit transpiration. Rind breakdown during degreening may be prevented by a high relative humidity, preferably in combination with a low airflow. In oranges which had been properly degreened rind breakdown was not increased by colour-added treatment, and Dowicide A-Hexamine became more effective for decay control. Ethylene was not a factor in the development of rind breakdown. The incidence of breakdown was increased by standing the fruit in open crates while washing, and decreased by waxing them promptly.

837. HAYWARD, F. W., AND GRIERSON, W.
Color-adding and protective coating processes for citrus fruits.
A.R. Fla agric. Exp. Stats, 1956-57, pp. 207-8.

In shipping tests to Antwerp a fungicidal water wax, Lake Alfred Wax 101A, gave promising results for citrus protection. Apparatus used to evaluate the gloss of various waxes on citrus fruit has been adapted to measure gloss without peeling the fruit.

838. LONG, J. K., AND ROBERTS, E. A.
The phytotoxic and fungicidal effects of sodium *o*-phenylphenate in controlling green mould wastage in oranges.
Aust. J. agric. Res., 1958, 9: 609-28, bibl. 11, illus.

Solutions of sodium *o*-phenylphenate control green mould wastage (due to *Penicillium digitatum*), but can cause rind injury in oranges. Data are given on the effects of varying concentrations and pH levels of sodium *o*-phenylphenate solutions, duration of dip, rinsing, and the addition of hexamine. The occurrence of rind injury is due to absorption of *o*-phenylphenol, and the effectiveness on wastage control depends upon the levels of both sodium *o*-phenylphenate and *o*-phenylphenol. The degree of rind injury depends primarily upon the concentration of *o*-phenylphenol in the solution, which can be controlled by pH adjustment. Accordingly, an explanation of the role of hexamine is given. Sodium *o*-phenylphenate control of mould wastage is superior to control by borax-boric acid. [Authors' summary.]—Citrus Wastage Res. Lab., Gosford, N.S.W.

839. SPERONI, H. A., AND TURICA, A.
Control de tephritidos en frutos cítricos por medio de fumigación. (Control of fruit flies in citrus by fumigation.)
Idia, 1958, No. 123, pp. 17-21, bibl. 3, illus.

Ethylene dibromide was used at concentrations ranging from 5 to 8 c.c. per cu.m. for periods of 2 or 3 hours and at temperatures between 10 and 33° C. in a chamber of 2 cu. m. with an air circulator and vent pipe controlled by valves. Tests were carried out on oranges and grapefruit attacked by *Ceratitis capitata* and *Anastrepha* spp. It was concluded that: the fruit should not be wrapped or coated before treatment; the fumigant was not impeded by fruit boxes or burlap bags; the initial temperature should not be below 21° C. and subsequent temperatures should not exceed 40° C.; if the fumigant was placed near the source of heat for rapid volatilization, an adequate fumigation period was 2 hours, using at least 6 c.c. per cu.m. and adult flies and pupae died during treatment and larvae inside the fruit died within 3-5 days.

Dates.

(See also 858n, q.)

840. KHUDAIRI, A. K.
Studies on the germination of date-palm seeds. The effect of sodium chloride.
Physiol. Plant., 1958, 11: 16-22, bibl. 5.

Date seeds, variety Zahedi, were germinated in water, salt solutions or sugar solutions in petri dishes. The optimum temperature for germination was found to be 25-27° C. Low concentrations of salt solution, 0.1-1.0% NaCl, caused some inhibition in the early stages of germination and concentrations of 2% NaCl caused complete inhibition. Concentrations of sugar solution higher than 1.5% sucrose caused some inhibition of germination, the effect being much greater than that of a salt solution of similar osmotic pressure. Morphological changes in the seed, starting with the emergence of the radicle, were apparent 10 days after the addition of water; lateral roots appeared on the 44th day.—Coll. Arts and Sciences, Baghdad, Iraq.

841. NIXON, R. W.
New root development on trunks of date palms buried in soil.
Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 6-8, bibl. 5, illus.

In 1923 a date palm, about 13 years old and 13 ft. high to the bud, was dug up and replanted 10 ft. deeper in another site. In 1924 another palm, about 14 ft. tall, was pulled down and the trunk covered with soil; 6 years later the trunk of the palm was lowered still further by digging a trench about 3 ft. deep. Both methods of reducing the

height of palms resulted in the formation of a new root system 9 to 10 ft. from the base, but at least 10 years elapsed before this appeared and up to 20 years elapsed before it was fully developed. Thus, in the few special circumstances in which it is desired to transplant and reduce the height of date palms, it would seem desirable to ensure initially that the old root system is supplied with an adequate amount of top soil and water.—U.S. Date Field Stat., Indio, Calif.

842. FURR, J. R., AND ARMSTRONG, W. W., JR.
The influence of heavy irrigation and fertilization on growth, yield and quality of Deglet Noor dates.

Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 22-4, bibl. 8.

Four years' results are reported for a trial in which Deglet Noor dates growing on a very fine sandy soil that had received no fertilizer for 9 years were irrigated at rates of 6, 10 or 14 ft. per year. On 1/3 of each irrigation plot the trees received 1/3 lb. N in organic and inorganic forms. The different rates of irrigation had little effect on tree growth or fruit yield and quality. On the other hand, N produced a response more rapidly than in previous experiments. The growing of leaves and fronds improved markedly in the first year and inflorescence production and yields in the second. However, fruit quality, which was poor before the experiment started, remained poor both in the N and minus-N plots, even in the fourth year in which the weather favoured quality. In the case of the plots it is believed that the amounts of N applied were excessive.—U.S. Field Stat., Indio, Calif.

843. SCHROEDER, C. A., AND NIXON, R. W.
Morphological effects of specific pollens and fruit thinning on fruit of Deglet Noor dates—a progress report.

Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 17-18, bibl. 5.

When Deglet Noor flowers were fertilized with almond pollen the fruit produced was smaller than that produced from flowers fertilized with Crane pollen. On the other hand, hard thinning of the branches resulted in an appreciable increase in fruit weight in both cases. It is suggested that specific pollens may possibly affect cell number in the early division stage of fruit development, whereas hard thinning may result in the enlargement of individual cells during later stages of development. Univ. Calif., Los Angeles and U.S. Date Field Stat., Indio.

844. VINCENT, L. E., AND LINDGREN, D. L.
Control of the date mite, *Oligonychus pratensis* (Banks), in California.

Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 15-17, bibl. 9.

Damage done by the mite to developing date

fruits is described. Between 1948 and 1956 many new acaricide dusts were tested for its control in comparison with the standard sulphur dust treatment and with untreated trees. Most of the compounds tested were ineffective or phytotoxic. Apart from sulphur only Trithion and Kelthane, both at 5%, gave reasonable control without damaging the fruit. On a cost-per-acre basis, however, sulphur remains the most effective treatment.—Univ. Calif., Riverside.

845. RYGG, G. L.

Influence of handling procedures and storage and transit temperatures on improving and maintaining quality of dates.

Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 2-5, bibl. 18.

Flavour, texture and colour are among the best indicators of quality, but at present there are no satisfactory means of expressing these characteristics quantitatively. Sugar content and odour are generally of little value in estimating quality, but pH is associated with quality to some extent. Various methods of improving quality in dates that have not become too dry and hard are discussed. Retention of quality may be aided by lowering the moisture content, by using a volatile fungicide containing ethylene oxide, by storage in vacuum or in an inert gas and by refrigeration. Deglet Noor dates should be stored at 32° or 0° F., depending on the moisture content and length of storage. Soft-type dates should be stored at 0° F. to avoid sugar spotting. After removal from cold storage dates should be marketed as quickly as possible. Attempts to preserve colour and flavour with various antioxidants have failed.—U.S. Dep. Agric., Pomona, Calif.

Litchis.

846. YOUNG, T. W.

Lychee.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 353-5.

Branches of Brewster trees were girdled three-quarters round the circumference, leaving a bark-band uncut. At the Subtropical Experiment Station at Homestead branches girdled in September produced slightly more than twice as much fruit as corresponding control branches, and those girdled in October and November produced about one-third more than the controls. In other groves yields from girdled branches averaged only a few more fruits than yields from control branches. Sprays of sodium naphthalene acetate applied at 110 p.p.m. to commercial groves did not induce dormancy or increase yields; higher concentrations were phytotoxic. Observations from survey plots on litchi responses to environment are also reported.

SUB-TROPICAL FRUIT AND PLANTATION CROPS

Macadamias.

(See also 858k.)

847. COOIL, B. J., AND OTHERS.

Fertilizer components in macadamia nuts.

Hawaii Fm Sci., 1958, 7 (1): 4-5, bibl. 1.

As a basis for estimating the amount of nutrient elements removed in a macadamia crop, data are tabulated on the contents of N, P, K, Ca and Mg contained in the husk, shell and kernel of 3 varieties. Each 100 lb. of nuts contained about 0.4 lb. N and the same amount of K₂O; the other elements were present in much smaller quantities. As 84% of the K₂O and 52% of the N present in the nut was found in the husk, it is suggested that the husk should be returned to the orchard soil.

Olives.

(See also 217n, 858s, w.)

848. HARTMANN, H. T.

Rootstock effect on olive.

Calif. Agric., 1958, 12 (9): 13-14, illus.

In long term studies with 3 scion varieties and 12 rootstocks, own-rooted trees of 2 varieties (Mission and Manzanillo) were more vigorous and fruitful than trees grafted on any of the rootstocks tested. With Sevillano trees on some rootstocks were more vigorous than own-rooted trees. In general, there was no rootstock effect on fruit characteristics, although trees on *Olea ferruginea* and *O. verrucosa* produced fruit with a reduced length-width ratio and an increased percentage of shotberries.

849. BREVIGLIERI, N.

L'allevamento dell'olivo in coltura intensiva.

(Training olive trees for intensive culture.)

Ital. agric., 1958, 95: 545-57, bibl. 2, illus.

The free palmette, vase and espalier-hedge forms, described and illustrated here, present many advantages, particularly for table olives, but conditions for growth must be good and experienced pruners are essential.

850. HELY, P. C.

The brown olive scale (*Saissetia oleae*, [Bern.]).

Agric. Gaz. N.S.W., 1958, 69: 307-8, illus.

The life history and damage are described. On olives and certain shrubs control may be obtained by spraying white oil, 1 gal. in 40 gal. water, at the time of peak emergence of larvae. On citrus trees a weaker oil emulsion plus malathion w.p. is advisable. Chlordane or dieldrin are recommended to deal with the attendant ants. Natural predators of the scale are listed.

Passion fruit.

851. PURSS, G. S.

Studies of the resistance of species of *Passiflora* to fusarium wilt (*F. oxysporum* *passiflorae*).

Qd J. agric. Sci., 1958, 15: 95-9, bibl. 1, illus.

A degree of resistance to fusarium wilt was obtained in certain seedlings of the purple passion fruit (*P. edulis*), but it was only sufficient to delay infection and was not of commercial value. Other species and varieties were tested, but, on the whole, those that showed resistance did not possess the other necessary qualities of a rootstock. However, some strains of the golden passion fruit (*P. edulis* *flavicarpa*) showed promise as rootstocks [see also *H.A.*, 28: 4044]. J.R.L.

Persimmons.

(See also 858c.)

852. PUPYŠEVA, L. I.

A bacterial disease of persimmon. [Russian with German summary.]

Bjul. nauč.-tehn. Inform. Gos. Nikitsk. b. Sada, 1957, No. 2, pp. 39-40, from Ref. 1 (Biol.), 1957, No. 22, Abstr. 94,229.

The disease, first observed on the southern shore of the Crimea in 1951, attacks all parts of the plant. It first shows up in the spring, reaching a maximum in June-July. Bacteria isolated from diseased tissues resembled, but were not identical with *Bacterium carotovorum*, and it is probably a new species, specific to persimmon. Apart from the usual precautions spraying with 2% bordeaux early May is recommended.

Tung.

853. MERRILL, S., Jr.

Heterosis in tung.

Proc. Amer. Soc. hort. Sci., 1958, 71: 231, bibl. 4.

With the F₁ hybrid progeny of Lampton × Folsom and of La Crosse × Folsom a considerable degree of heterosis was evident in tree size in the nursery and orchard and in fruit yield. When all characters measured were averaged, the F₁ Lampton × Folsom exceeded its larger parental line by 4% and the F₁ La Crosse × Folsom showed an increase of 27%. Heterosis was less evident in crosses of Folsom and Lampton with G-46.—U.S.D.A. Bogalusa, La.

854. BARROWS, H. L., AND DROSDOFF, M.

Effect of nitrogen, potassium, calcium, and magnesium on mineral composition of Lampton and fine sand in relation to mineral composition of tung leaves.

Proc. Soil Sci. Soc. Amer., 1958, 22: 426, bibl. 18.

In a 7-year experiment, Mg-deficient tung trees were given annual soil applications of N, K, Ca and Mg, each at 2 levels, the N sources being sodium nitrate, ammonium nitrate and urea. Applications of Zn, Mn and Cu were also made during the period. At the higher N level urea was the least effective N source as measured by the increase of leaf N. High K and Ca levels decreased leaf N. Leaf P was reduced by high Ca and Mg, but increased by high applications of urea or ammonium nitrate, particularly at the low K level. Leaf K was increased by high K and depressed by high Ca, Mg and sodium nitrate, particularly when these were combined. Leaf Ca responded positively to Ca application and was reduced by high N, K or Mg levels. Sodium nitrate was the most favourable source for Ca uptake. Leaf Mg was increased by applied Mg and reduced by K and Ca, markedly at low N and Mg levels, but only slightly or not at all at the high N level. Yield was highest when Ca, Mg and ammonium nitrate were all applied at high levels, and was lowest when the high level sodium nitrate was combined with low levels of K, Ca and Mg. Correlations between leaf and fruit contents of K were linear at all soil depths studied. Results indicated that the top 6 inches of soil should be 1.4-2% saturated for K, 3% for Mg and 15-25% (depending on the source) for Ca.—U.S.D.A. and Fla agric. Exp. Stat., Gainesville.

85. NEFF, M. S., BARROWS, H. L., AND SHEAR, C. B.

Response of tung trees to applied nitrogen, potassium and magnesium in different soil types.

Proc. Amer. Soc. hort. Sci., 1958, **71**: 237-40, bibl. 5.

Three levels of N, K and Mg were applied to tung trees growing in a sand and in a sandy loam. On the sand increasing N levels greatly increased trunk cross-sectional area and yield, whereas applied K and Mg had only minor effects. On the sandy loam increasing K levels greatly increased trunk cross-sectional area and yield, whereas the N and Mg had only minor effects. On both soils leaf N increased with applied N; high levels of applied N tended to increase leaf Mg on sand and to decrease on soil. Leaf K on both soils increased with applied K and decreased with increasing N. Leaf Mg was reduced by high levels of applied K.—U.S.D.A., Cairo, Ga, and Fla agric. Exp. Stat., Gainesville.

86. LAGASSÉ, F. S., AND OTHERS.

U.S. Field Laboratory for Tung Investigations.

A.R. Fla agric. Exp. Stats, 1956-57, pp. 112-14.

Nutritional studies: In sand culture experiments the growth of tung trees (measured by total plant weight) receiving nitrate N averaged over 2½ times

that of trees receiving ammonium N. The severity of B-deficiency symptoms was affected by B level, by N source and level, and by Ca level and their interactions; N source and level also affected the severity of Ca-deficiency symptoms. An addition of 10 p.p.m. Zn to the soil reduced the growth of young seedlings, and root weights were also reduced by Zn applications above this level. In N, P, Mg factorial experiments the oil content was reduced at the higher levels of N in one-year-old Isabel seedlings. In Lampton and L-152 seedlings the oil content was higher when Uramon was used as the main N source than when sodium nitrate was used; in these seedlings total oil per tree was highest when medium levels of N and K were given with low Mg. The application of 3 N levels and 5 K levels at 6 N/K ratios did not affect the percentage oil in the fruit.

857. BAUMANN, L. A.

Cutting costs for tung fruit.

Agric. Mktg, 1958, **3** (8): 13, illus.

By storing tung fruits off the ground in raised bins, the moisture content can be kept low, thus reducing subsequent transport costs. Savings could also be made by hulling the nuts before shipment.

Noted.

858.

a BANFI, A.

Anotaciones sobre cierto material cítrico. (Notes on some citrus material.)

Idia, 1958, No. 123, pp. 1-5, illus.

Various abnormalities, including a cold resistant trifoliate orange × rough lemon hybrid.

b BERNHARD, R. A.

Occurrence of coumarin analogues in lemon juice.

Nature, 1958, **182**: 1171, bibl. 8.

Five coumarin compounds identified.

c BUAČIDZE, S. I.

Drying persimmon in a field of high frequency current. [Russian.]

Sad i Ogorod, 1958, No. 7, pp. 61-2, illus.

Drying 1 ton of persimmons to 30% moisture needed 1,800 kilowatt-hours.

d BURKE, J. H.

Citrus industry of Chile.

Foreign agric. Rep. U.S. Dep. Agric. **108**, 1958, pp. 19, illus.

Mainly information on production, costs and marketing.

e CALAVAN, E. C., CARPENTER, J. B., AND WEATHERS, L. G.

Observations on distribution of cachexia of citrus in California and Arizona.

Plant Dis. Repr., 1958, **42**: 1054-6, bibl. 8, illus.

In various mandarin and tangelo varieties.

- f CHASE, R.
History of the Florida citrus industry.
Citrus Ind., 1958, 39 (9): 5-6, 8, 11, 16-17, bibl. 6.
- g CHILDS, J. F. L., NORMAN, G. G., AND EICHORN, J. L.
A color test for exocortis infection in *Poncirus trifoliata*.
Phytopathology, 1958, 48: 426-32, bibl. 15, illus.
Aldehyde-coupling reagents give colour reactions before the onset of bark scaling.
- h (FEDER, W. A., AND FORD, H. W.)
Nematode-resistant citrus rootstock.
Agric. Res. Wash., 1958, 7 (3): 7, illus.
Radopholus similis [see H.A., 27: 2803 and 28: 4045e].
- i FORD, H. W., AND FEDER, W. A.
Procedures used for rapid evaluation of citrus for resistance to certain endoparasitic nematodes.
Proc. Amer. Soc. hort. Sci., 1958, 71: 278-84, bibl. 16, illus.
Radopholus similis.
- j GOODALL, G. E., AND BITTERS, W. P.
Lemon fruit quality studied.
Calif. Agric., 1958, 12 (10): 12.
See note in H.A., 28: 3026u.
- k HAMILTON, R. A., AND HOLTZMANN, O. V.
Macadamia bark disorder discovered.
Hawaii Fm Sci., 1958, 7 (1): 3-4, illus.
An unidentified disease causing cankers above the graft union on the variety Wailua.
- l JANSEN, E. F., JANG, R., AND BALLS, A. K.
Citrus aminopeptidases.
Arch. Biochem. Biophys., 1958, 76: 461-73, bibl. 24.
The main proteolytic enzymes of citrus fruits.
- m LABANAUSKAS, C. K., EMBLETON, T. W., AND JONES, W. W.
Deficiencies of micronutrients.
Calif. Agric., 1958, 12 (10): 10.
Effects of P on micronutrients in avocado leaves [see H.A., 28: 1789 and abstract 781 above].
- n MAIER, V. P., AND SCHILLER, F. H.
Date research program at the Pasadena laboratory.
Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 13-15, bibl. 10.
On chemical changes associated with deterioration during storage and on new date products.
- o RENNINGER, G., COFFEY, J., AND SOKOLOFF, B.
Effect of hydrogenated fish oils on citrus-tree destroying nematodes.
Plant Dis. Repr., 1958, 42: 1057-65, bibl. 12, illus.
Includes details of apparatus; for results against *Radopholus similis* see H.A., 28: 1814.
- p ROISTACHER, C. N., AND OTHERS.
Some factors in the control of blue-green mold decay of citrus fruit with ammonia.
Plant Dis. Repr., 1958, 42: 1112-22, bibl. 18, illus.
See H.A., 28: 799.
- q SCHILLER, F. H., AND MAIER, V. P.
Evaluation of some physical methods for determining the moisture content of dates.
Rep. 35th annu. Date Grs' Inst., Coachella, 1958, pp. 19-22, bibl. 13.
A rapid method effective over the range of 4 to 24% moisture.
- r SELHIME, A. G.
Dieldrin for control of Fuller rose beetle attacking potted citrus trees in a greenhouse.
J. econ. Ent., 1958, 51: 284.
Pantomerus godmani.
- s THOMAS, H. E.
Sickle leaf of olive.
Plant Dis. Repr., 1958, 42: 1154, bibl. 3, illus.
Graft transmissible, presumed to be caused by a virus.
- t U.S. DEP. AGRIC. FOREIGN AGRICULTURAL SERVICE.
The citrus industry of Peru.
Foreign Agric. Circ. U.S. Dep. Agric. FCF3-58, 1958, pp. 6.
Acreage, production and marketing.
- u WALLIHAN, E. F., EMBLETON, T. W., AND PRINITY, W.
Avocado zinc deficiency.
Calif. Citrogr., 1958, 43: 420-1.
See H.A., 28: 3999 for another account.
- v WEATHERS, L. G.
Cross-protection studies with yellow-vein and certain other viruses of citrus.
From abstr. in *Phytopathology*, 1958, 48: 395.
No protection against yellow-vein afforded by cachexia exocortis, psorosis, tristeza or vein-enation in limes.
- w WHITEHEAD, V. B., AND MYBURGH, A. C.
Insect pests of olives.
Fmg S. Afr., 1958, 34 (6): 38-40, illus.
Control programme for beetles, tingitid scale insects, psylla, olive fly and wasps.
- x ZENTMYER, G. A.
Resistance to *Phytophthora cinnamomi* in the genus *Persea*.
From abstr. in *Phytopathology*, 1958, 48: 39.
Progress in the search for a resistant root stock for avocado.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 972, 982, 983, 996, 1005.)

59. MOHRMANN, J. C. J.

Irrigation par aspersion; aspects agricoles, techniques et économiques. (**Irrigation by sprinkling; agricultural, technical and economic considerations.**) [Flemish summary 3 pp.] *Bull. agric. Congo belge*, 1958, 49: 877-921, bibl. 39, illus.

This paper includes illustrations and technical details of various types of overhead irrigation equipment suitable for use in tropical annual and perennial crops, and provides notes on irrigation practice and examples of installation and running costs.—Stat. Rech. agron. I.N.É.A.C., Mvuazi.

Bananas.

(See also 960z.)

60. PHADNIS, N. A., AND GOPALKRISHNA, N.

Don't let the bananas get sunburnt.*Indian Hort.*, 1958, 2 (2): 28-30, 32, illus.

Sunburn may affect pseudostems, peduncles or individual fruits, and in India it is the most important cause of fruit spoilage in the field. For protection the following practices are recommended:—(1) Close spacing. (2) Old dry leaves should be removed. (3) Dry banana leaves should be kept round exposed stems, especially those of tall varieties. (4) Exposed bunches and peduncles should be covered with dry leaves.

51. EVANS, S. G.

Control of banana leaf spot. Report on trials with oil and other fungicides in Jamaica: 1956-57.*Rep. Fernhurst Res. Stat.*, 1957, pp. 9, cyclostyled.

Low-volume drift spraying trials against leaf spot on Lacatan bananas, 2 types of commercial spray oil and copper fungicides were used alone and in various combinations. In all 7 trials spraying with oil alone gave outstanding control, both types of oil being equally effective. The addition of copper slightly enhanced the fungicidal effect but also increased phytotoxicity. The addition of diesel oil increased phytotoxicity without increasing the effectiveness of the spray. Neither Perenox plus wetter in water applied by Motoblo nor bordeaux applied by hand lances was effective. Oil spraying caused scorching on leaves and fruit but only severely so when a direct blast of spray was received. Using the Motoblo shoulder-mounted mist blower 1 man could spray 1 acre in 15 minutes with oil, compared with 30 minutes for Perenox and 4 hours for bordeaux. It is suggested that plantations could be cleaned up by using 2 gal. oil per acre every 10 days or fort-

night, spraying about 6 times. Thereafter, spraying could be reduced to 1-1½ gal./acre every 3 weeks and thus minimize scorching. The actual spraying technique is also discussed.—Res. Dep., Banana Bd, Jamaica, and Plant Protection Ltd.

Cacao.

(See also 7, 20, 71h, 960j, n.)

862. URQUHART, D. H.

Prospects of cocoa-growing in Uganda and Zanzibar.**Report on the possibilities of growing cocoa in the Protectorate of Nyasaland.**[Publs.] *Cadbury Bros.*, Bournville, 1958, pp. 28 and 16, both illus., 5s. each.

These are the reports made on a tour of East and Central Africa in 1957 to investigate the prospects of growing cacao. Each report discusses the agricultural conditions in the territory and such previous plantings of cacao as have been attempted. In brief, the author summarizes his impressions as follows: *Uganda*: In certain areas rainfall and soil are suitable, and, even if cacao is given priority over robusta coffee on some of the better soils, large areas still remain where coffee could be expanded. *Zanzibar*: The climate is suitable and cacao of Forastero type could be developed on a fairly wide scale. *Nyasaland*: The climate is suitable and some soils are exceptionally good. Development is recommended in the Shire River Valley. A basic type such as the Amelonado and Upper Amazon grown in West Africa and Brazil is suggested.

863. JONES, T. A., AND MALIPHANT, G. K.

High yields in cacao field experiments and their significance in future cacao research.*Trop. Agriculture Trin.*, 1958, 35: 272-5, bibl. 6.

Very high yields of a few trees not attributable to experimental treatments are accounted for by: (i) certain planting years being especially favourable; and (ii) differences in initial plant size which may result from good management. A close correlation found between early girth and later yield provides a criterion of great value in the study of this perennial crop.—Reg. Res. Centre, I.C.T.A.

864. OSTENDORF, F. W.

Identifying characters for cacao clones.*Sep. VI Reunião Com. téc. interamer. Cacao 1956*, reprinted as *Bull. LandbProefst. Suriname* 70, 1957, pp. 89-110, bibl. 18, illus.

With cacao the branch system and the leaves were found to be of little practical value for identification, mainly because their characters are too

variable within a clone. This variability is largely caused by environmental factors. Likewise, the pod characters have only a very limited value for this purpose. On the other hand, some flower characters proved to be of great value for clone identification. Of these, the characters of the petal "limb" and ovary were extensively studied. Considerable variability between clones was found with respect to the shape of the petal "isthmus" and its transition to the petal "wing". The wing itself varies in its relative width, the level of its maximum width, the degree of convexity of its sides, the length of its point, and in its colour. For comparisons it is recommended to mount ten petal "limbs" from separate large-sized flowers per tree in glycerol under a cover glass. Ovaries should be studied under a low-power microscope; they differ mainly in their general shape and in the position of the upper boundary of the glandular hairs. [From author's summary.]

865. MÜNTZING, A.

Disease resistance in field trials with cacao at Hacienda Clementina, Ecuador.

Trop. Agriculture Trin., 1958, **35**: 276-8, bibl. 5.

Field trials of 32 ICS (including Upper Amazon) and 18 other clones are reported with special regard to witches' broom disease and also to pod infections due to this disease and to *Monilia* and *Phytophthora*. The best resistance to witches' broom was shown by SCA 6, SCA 12 and P12A, and of these the first 2 also showed fair resistance to pod infection. In general, local selections showed better pod resistance than the ICS clones. There was only a slight and insignificant correlation between total witches' broom and general pod infection. As well as some actual resistance, some disease avoidance was also observed among the ICS clones, pods being produced at the end of the dry season when infection was low.—Univ. Lund, Sweden.

866. GRIFFITHS, L. A.

Phenolic acids and flavonoids of *Theobroma cacao* L. Separation and identification by paper chromatography.

Biochem. J., 1958, **70**: 120-5, bibl. 16.

Most previous investigations of the phenolic constituents of cacao have been concerned with ripe beans. In the present study the tree as a whole, mainly in the shape of clone I.C.S. 1, has been considered. Data are presented on the phenolic and flavonoid compounds and on the methanol-soluble polyphenols found in sap wood, heart wood, bark, roots, green stems, leaves (young and mature), flowers, pod walls (young and old) and beans (cotyledons and skin). The results show that the phenolic compounds of cacao vary not only from tissue to tissue but also with the physiological age of the material.—I.C.T.A., Trinidad.

867. ROHAN, T. A.

Processing of raw cocoa. II. Uniformity in heap fermentation and development of methods for rapid fermentation of West African amelonado cocoa.

J. Sci. Food Agric., 1958, **9**: 542-51, bibl. 9.

An earlier investigation [*H.A.*, 28:3057] had shown that in heaps of fermenting cacao beans temperatures and fermentation rates in the centre and at the surface differed appreciably. In the series of investigations described here batches of cacao were fermented in heaps, sweat boxes and trays, and some of the physical and chemical changes that occurred during fermentation at different levels in the cacao mass were examined. The results indicate that when cacao is fermented in heaps: (1) The temperature of the surface 4-in. layer rises more rapidly than the temperature in the centre and that the beans in the surface layer are killed more rapidly. (2) Chocolate flavour is developed much more rapidly than has been believed hitherto, and it has been possible to obtain an acceptable product after only 30 hours fermentation at the surface of a heap. (3) In the centre of a heap changes occur more slowly, but once the beans die chocolate flavour again develops rapidly. (4) No change in the concentration of polyphenols occurs before the death of a bean, but thereafter the anthocyanin concentration, which is negatively correlated with quality, declines rapidly both during the final stages of fermentation and during drying. (5) For the mixing of heaps of cacao to be of any value it must initially be carried out after the first 24 hours. Where beans are fermented in sweat boxes holding up to 1 ton changes are much slower than in heaps owing to lack of aeration, but this can be largely overcome by more frequent mixing. Based on these findings a method has been evolved for fermenting amelonado cacao rapidly and this is described fully elsewhere [see next abstract].—W.A.C.R.I.

868. ALLISON, H. W. S., AND ROHAN, T. A.

A new approach to the fermentation of West African amelonado cocoa.

Trop. Agriculture Trin., 1958, **35**: 279-88, bibl. 8, illus.

A method is described in which the beans are fermented in wooden trays, 4 ft. × 3 ft. × 4 in. deep with slatted bottoms, which are stacked one above the other. Fermentation takes place within 2 to 3 days without mixing. Each tray has a partition and only one half, holding 100 lb. of wet beans, is used for fermentation. After fermentation the whole tray is used for drying. This method is cheaper in labour costs and produces a better product than the traditional methods.—W.A.C.R.I.

869. CONATY, F. N. G., AND SMITH, M.

Microfermentation of cocoa for selection work. *Malay. agric. J.*, 1958, **41**: 39-45, bibl. 15, illus.

the fermentation of cacao, particularly on a small scale, is discussed and a multiple microfermentary described. This consists of beakers set in a thermostatically controlled water bath. The process of microfermentation using this apparatus is described, as also the production of nib paste and inoculate for tasting purposes.

Coconuts.

(See also 960g-i, k, o-q, x, 961b, k.)

870. LIYANAGE, D. V., AND ABEYWARDENA, V.
Correlations between seed-nut, seedling and adult palm characters in coconut.

Trop. Agriculturist, 1957, **113**: 325-40, bibl. 2, illus.

Correlations between 14 characters, within and between parents, are presented and their bearing on seed selection discussed. In addition to the established criteria for selecting seed parents, it is desirable to select palms giving large and heavy nuts, about 4,000 c.c. in volume, that sprout early and produce a high percentage of tall vigorous seedlings. Early sprouting, early flowering and high initial yield are reliable early characters of a high-yielding adult palm.—Coconut Res. Inst., Ceylon.

871. ALBUQUERQUE, S. D. S., AND KOYAMU, K.
An agronomic approach for increasing coconut yields in the laterite soils of the west coast.
Indian Coconut J., 1957, **10** (2): 15-24, bibl. 10.

2 field experiments ploughing thrice annually resulted in higher yields and greater financial returns than, in the first trial, ploughing once or twice or digging once, and, in the second trial, ploughing twice or digging once, or mounding up and later levelling the soil.—Coconut Res. Stat., Madras.

872. JOHN, C. M.
Fertilisers for coconut palms.

Coconut Bull., 1958, **12**: 161-5.

Based on the results of numerous demonstration plots on growers' land, an annual dressing per palm of 0.75 lb. N, 0.75 lb. P_2O_5 and 1.5 lb. K_2O , in addition to 50 to 100 lb. of organic manure or compost, is recommended.

873. OLLAGNIER, M., AND PREVOT, P.
Principales carences minérales de l'arachide, du palmier à huile et du cocotier en Afrique française. (Principal mineral deficiencies of peanuts, oil palms and coconut palms in French territories in Africa.)
Qual. Plant. Maveg., 1958, **3/4**: 550-68, bibl. 11.

Oil-palm leaf analyses for N, P, K, Ca and Mg showed K deficiencies, and in some areas, a secondary N deficiency, which were confirmed by fertilizer responses. Coconut palms showed a

marked yield response to K, but where this was applied alone (as KCl) for several successive years a Mg deficiency resulted. In one area a primary Mg deficiency was corrected, and the yield increased by 50%, by applying 0.5 kg. of magnesium sulphate per tree. Wilt (*Fusarium*) was prevalent where Mn was deficient. Coconut palms could compensate their low K supply to some extent by increased Na absorption, but a Na/K antagonism was evident when leaf Na exceeded 0.40%. The interaction between Na and Mg was complex, being antagonistic for low values of K and synergistic on plots receiving K fertilizer.—Inst. Rech. Huiles et Oléagineux, Paris.

874. DAVIS, T. A.

Rejuvenation of coconut palms.

Coconut Bull., 1958, **12**: 224-8, illus.

Air-layering of tall palms may be carried out by cutting 1 or 2 shallow rings round the trunk a few feet below the crown and confining this part of the stem in a large wooden box containing a mixture of soil, sand and coir dust. Regular watering is essential and adequate root formation may take over a year. After severing the trunk below the box, the rooted crown is lowered by rope and pulley and re-planted.

875. COCONUT RESEARCH INSTITUTE OF CEYLON.
Diseases of the coconut palm.

Leaflet. Coconut Res. Inst. Ceylon **32**, 1958, pp. 2, illus.

Provisional recommendations for control measures are as follows: Grey blight (*Pestalotzia palmarum*) by correcting nutrient deficiencies in the soil; Stem bleeding disease (*Ceratostomella paradoxa*) by cutting out the diseased portions of the stem and applying Fylomac or bordeaux paste to the wound and above and below it; Bud-rot (*Phytophthora palmivora*) prophyllaxis by spraying Perenox on healthy trees surrounding the diseased ones, and where palms are partially affected cutting out the diseased areas and treating the wound with bordeaux paste.

876. DRING, D. M.

Cape St. Paul wilt disease in the Keta district.

Ghana Fmr, 1958, **2**: 50, 62.

The present situation is reviewed. Since 1953 a campaign to fell and burn all diseased palms as soon as the disease is observed has resulted in considerable reductions in number of rhinoceros beetles and in the rate of spread of the wilt disease.

877. BACHY, A., AND HOESTRA, H.

Contribution à l'étude de la "maladie de Kaincopé" du cocotier au Togo. (Contribution to the study of Kaincope disease of coconut palms in Togo.) [English summary $\frac{1}{2}$ p.]

Oléagineux, 1958, **13**: 721-9, bibl. 8, illus.

The symptoms of this disease are nutfall and yellowing followed by death in about 5 months. Replacements die after about 5 or more years. It is considered to be the same disease as Cape St. Paul wilt in Ghana. Its resemblance to other coconut diseases of unknown causes is discussed. Statistical studies of the spread of the disease indicate that it is of a contagious nature, and nutritional experiments have not indicated any mineral shortage as the cause. The rate of spread reaches a maximum at the end of the rainy season. There is some indication that dwarf palms may be resistant.—I.R.H.O.

878. VERGHESE, E. J., SHANKARANARAYANAN, M. P., AND MENON, K. P. V.

A note on the strontium content of coconut leaves and soils in relation to "leaf" and "root" (wilt) diseases of coconuts in Travancore and Cochin.

Indian Coconut J., 1957, **10** (2): 25-31, bibl. 18, illus.

Samples were examined spectrographically and Sr was found only in trace quantities averaging less than 0.28 and 0.21 p.p.m. for healthy and diseased trees respectively. There is therefore insufficient evidence to suggest that the Sr content is connected with the incidence of these diseases.—Cent. Coconut Res. Stat., Kayangulam.

879. BROWN, E. S., AND GREEN, A. H.

The control by insecticides of *Brontispa longissima* (Gestro) (Coleopt., Chrysomelidae—Hispiinae) on young coconut palms in the British Solomon Islands.

Bull. ent. Res., 1958, **49**: 239-72, bibl. 12, illus.

Damage is mostly confined to young palms, and Malayan-type seedlings suffer worse than those of Samoan or local origin. Fertilizer treatment had no effect on the extent of damage. In numerous trials control was achieved with DDT, chlordane and dieldrin, but dieldrin was superior. Dieldrin, at 0.15%, controlled moderate infestations when sprayed every 6 weeks: maximum frequency under very adverse conditions would be at intervals of 2-4 weeks. Young palms up to 3 years old needed 16 c.c. spray, or 6 c.c. with a low volume atomizer, applied downwards on the central spike. Extensive field-scale trials using proprietary formulations of both DDT and dieldrin were completely successful.—Commonw. Inst. Ent., and Levers' Pacific Plantations.

880. VALSALA, P. G.

A white grub attacking roots of coconut palm.

Coconut Bull., 1958, **12**: 240-3, illus.

The life history of, and damage caused by, the cockchafer *Leucopholis coneophora* are described. Control in field experiments has been obtained by dusting with 5% chlordane at 28 lb./acre or 5%

BHC at 56 lb./acre followed by ploughing or digging.

881. NIRULA, K. K.

Investigations on the pests of coconut palm. Part IV—*Rhynchophorus ferrugineus* F. *Indian Coconut J.*, 1956, **10** (1): 28-44, bibl. 36 [received 1958].

The biology of this weevil has been described earlier [*H.A.*, 28: 1998u]. Various control measures have been under trial and the best results were obtained with injections of 1% pyrethrins-piperonyl butoxide. One infection of 1,500 c.c. in adult and 500-1,000 c.c. in young palms was usually sufficient, although, in some cases, a second similar dose had to be given 4 months later. Chlordane also gave promising results.

882. ATEN, A., MANNI, M., AND COOKE, F. C.

Copra processing in rural industries.

F.A.O. agric. Develop. Pap. **63**, 1958, pp. 122 bibl. 7 pp., illus., \$1.50 or 7s. 6d.

This booklet is intended for extension workers supervisors in the copra industry and those responsible for the training of workers and craftsmen. Its contents are essentially practical and provide a thorough and detailed account of the methods of copra production. Some 18 improved types of copra drier are described, ranging from simple erections suitable for small-holders and for use in less advanced areas to large, continuous indirect driers. There are useful chapters on copra conflagrations, sulphur dioxide treatment, defect caused by microorganisms and insects and grading for quality. Although the major by-product, coir fibre, is not fully dealt with, there is a useful chapter on the production of coconut shell charcoal. The illustrations and diagrams are numerous and clear, and greatly assist the descriptions of the various types of copra kiln, especially those which can be made locally.

Coffee.

(See also 356, 960f, j, w, y, 961g, h, j, n, 966.)

883. ANTUNES, H. (FILHO), CARVALHO, A., AND OTHERS.

Melhoramento do cafeeiro. XI. Análise de produção de progênies e híbridos de Bourbon Vermelho. XII. Variabilidade em linhagens puras de café Bourbon Amarelo. (Coffee breeding. XI. Analysis of production progenies and hybrids of Red Bourbon. XII. Variability in pure lines of coffee. Yellow Bourbon coffee.) [English summary] *1½, 1 and 1½ pp.*

Bragantia, 1957, **16**: 175-95, bibl. 9; 197-210 bibl. 12; 411-54, bibl. 14.

Low-yielding Red Bourbon progenies can be safely eliminated after 4, or even 2, harvests although final selection of individual plants was

require yield data covering 12 or more years. Plant height was not reduced, but yield variation tended to increase, the percentage of "moca" seed tended to increase and that of "concha" seed to decrease, with repeated self-pollination. In Yellow Bourbon the yields per plant increased up to the 1st harvest and then showed a biennial rhythm. In this variety, mass selection needs to be begun rather later than in Red Bourbon, i.e. after 6 or 8 consecutive croppings, and can be based more on the average yields of progenies than on productivity of individual plants. Percentages of "moca" and "concha" seeds were partly dependent on locality. Few strains of Yellow Bourbon show great commercial promise.

884. DEDECCA, D. M.
Anatomia e desenvolvimento ontogenético de *Coffea arabica* L. var. *typica* Cramer. (Anatomy and ontogenetic development of *Coffea arabica* var. *typica*.) [English summary 2½ pp.]

Bragantia, 1957, 16: 315-66, bibl. 40, illus. The results are described of a detailed study of the developmental anatomy of the vegetative and productive organs of arabica coffee. The study covers primary and secondary roots, the shoot axes, stems, petioles and leaves, flowers, fruits and seeds. The text is supported by 45 figures and plates.

885. DEDECCA, D. M.
Aspectos anatômicos da variação na fôlha do cafeeiro. (Anatomical aspects of variegation in coffee leaves.) [English summary ½ p.]

Bragantia, 1957, 16: 389-410, bibl. 20, illus. Two distinct types of variegation occurred in Bourbon-type coffee. One was due to the chloroplasts in certain cells being abnormally small and yellowish, and the other was caused by partial or complete suppression of certain patches of palisade cells by a hypodermal development, resulting in deformation of the leaf.

886. SCARANARI, H. J., AND OTHERS.
Ensaio de profundidade de plantação de mudas de café. (Experiments on planting depth for coffee seedlings.) [English summary ½ p.]

Bragantia, 1957, 16: 367-76, bibl. 5. Preliminary trials were carried out with Yellow Bourbon coffee on 3 types of clay-loam soil. On all of these surface planting gave the best yields, and as planting depth increased there was a decrease in yield. This relationship was repeated over the period of the experiment (6 years in one and 4 years in the other locality). In the third soil, planting in holes 10 cm. deep gave the best results, surface planting ranked next, and planting 30 cm. deep gave lower yields than planting 20 cm. deep.

Further trials are envisaged on other soils including sandy types.

887. CULOT, J. P., VAN WAMBEKE, A., AND CROEGAERT, J.

Contribution à l'étude des déficiences minérales du caféier d'Arabie au Kivu. (Contribution to the study of the mineral deficiency of arabica coffee at Kivu.)

Publ. I.N.E.A.C. Sér. sci. 73, 1958, pp. 105, bibl. 47, illus., 120 B. fr.

This publication is divided into 3 parts. The first describes a study of the coffee soils of the area, the second the mineral deficiencies which have been found and the variations in the chemical composition of the coffee leaves which they cause, and the third the edaphic needs of arabica coffee. The elements, of which shortages have been observed and for which remedies are suggested, are N, P, Ca, Mg, K, Fe, Mn (also Mn excess) and B. The leaves of normal coffee trees contain, on average, per unit of dry matter, 2.9% N, 0.16% P, 1.1% Ca, 0.3% Mg, 2.35% K, 120 p.p.m. Fe, 120 p.p.m. Mn, 30 p.p.m. B, 30 p.p.m. Zn, 10 p.p.m. Cu and 0.8 p.p.m. Mo; cations total 140 m.eq. per 100 g. dry matter.

888. MALAVOLTA, E., PIMENTEL GOMES, F., AND COURY, T.

Estudos sobre a alimentação mineral do cafeeiro (*Coffea arabica* L. variedade Bourbon Vermelho). 1. Resultados preliminares.

Studies on the mineral nutrition of coffee (*Coffea arabica* var. Red Bourbon). 1. Preliminary results. [English summary 1½ pp.]

Bol. Super. Serv. Café, S. Paulo, 1958, 33(375): 10-24, bibl. 15.

Differential fertilizing with 27 kg. of N, 69 kg. of P_2O_5 and 123 kg. of K_2O per ha., in all possible combinations, was begun with 1-year-old coffee plants on sandy soil of low N and K status. Yield differences were established by the time of the 2nd harvest, the only significant increases being from NK and NPK treatments. Both N and K were active in reducing physiological dieback, and their effects were additive.

889. PEREZ S., V. M.

Abonamiento, poda y combate de malas hierbas en el cafeto. (Manuring, pruning and weed control in coffee plantations.)

Suelo Tico, 1958, 10: 41-88, bibl. 21.

This review covers major- and minor-element nutrition, fertilizer practices in Colombia, Hawaii and Costa Rica, manuring with coffee pulp and mulching with hay. Pruning systems are compared, and a section is included on pruning and maintenance of shade trees. The preparation and application of different types of herbicide are dealt with in considerable detail.

890. CASTILLO Z., J., AND CALLE V., H.
Observación del efecto de la giberelina en
plantulas de café. (*Observation of the effect
of gibberellin on coffee seedlings.*)
Cenicafé, 1958, 9: 56-64, bibl. 7, illus.

Seedlings of Bourbon coffee were treated on alternate days with a drop of 500 p.p.m. gibberellin solution on the stem apex. Within a fortnight the terminal internode had elongated markedly beyond those of control plants, and after 2 months both test and control plants were given 10-5-20 fertilizer, as the former had become chlorotic. Gibberellin treatment was suspended after 3 months for a 40-day period and then resumed as a weekly application at 500 p.p.m. in lanolin, to the terminal internodes and leaves. When the chlorosis was cured, the difference in height between test and control plants was reduced, and during the suspension of treatment was almost eliminated, but increased again steadily on resumption of treatment. After a total of 8 months the treated plants averaged 55% taller than the controls and had more internodes and leaves. Lateral stems, however, were only half as long as in controls. The leaves on treated plants were significantly longer and narrower than normal, strongly resembling those of the variety *Angustifolia*. Treatment reduced the total dry weight per plant and the proportion of root weight to shoot weight.

891. RODRÍGUEZ, R. A.

La mancha mantecosa, enfermedad por virus en el café. (*Blister spot, a virus disease of coffee.*)

Suelo Tico, 1958, 10: 94-7, illus.

The disease, which is described, is transmitted by the aphid *Toxoptera aurantii* and is spreading in Costa Rica. Control measures will probably involve the removal and destruction of affected plants.

892. RODRÍGUEZ, R. A., BIANCHINI, C. L., AND SOTO, C. A.

Arseniato de plomo como fungicida en el combate de "derrite" en el café. (*Lead arsenate as a fungicide for the control of "derrite" disease in coffee.*)

Suelo Tico, 1958, 10: 89-93, bibl. 5.

The name of the causal fungus has recently been changed from *Phyllosticta coffeicola* to *Phoma costarricense*. Lead arsenate at 3 lb. per 100 gal. of water, sprayed 3 times at intervals of 3 weeks at the end of the rainy season, reduced infection of coffee leaves from 93.13% to 55.27% and infection of new shoots from 81.64% to 39.14%. Of the other fungicides tested, none gave significant control on shoots, but Orthocide 50 (a captan product) at the same concentration, and Terrachlor (pentachloronitrobenzene) at 189 g. per 100 gal. reduced leaf infection to 67.49% and 69.70%, respectively.

893. CALCAGNOLO, G., AND LEIDERMAN, L.
As pulverizações concentradas no combate ao bicho-mineiro do cafeeiro. (*Concentrated sprays for control of the coffee leaf miner.*)

Bol. Super. Serv. Café, S. Paulo, 1958, 33(373): 9-23, bibl. 13.

Emulsions were generally more effective than wettable powders in trials with dieldrin, BHC and toxaphene, but the two forms of parathion were equivalent in action. Differences were more apparent with 5-week than with 3-week intervals between treatments. The greater degree of control resulting from reducing the interval from 5 to 3 weeks was not justified economically. Normally 3 treatments, beginning in late April or early May, with 0.4% dieldrin, 2% toxaphene or 0.25% BHC were sufficient, but 4 might be necessary under some conditions.

894. ANON.

The removal of coffee mucilage by means of caustic soda.

Papua New Guinea agric. J., 1956 (issued 1958), 11: 52.

Experiments have shown that caustic soda can be used to remove coffee mucilage without any adverse effect on quality. It is recommended that the pulped beans should be just covered by a solution containing 1 lb. caustic soda for each 200 lb. pulped beans ($\equiv$ about 400 lb. cherry) and the mass agitated for 15 minutes and then thoroughly washed.

895. JAKOBS, H., AND LEPP, H. P.

Pengeringan buatan kopi dan hasilnja (uit levering). (*The drying time of wet processed coffee and the dry weights obtained.*) [English summary 6 lines.]

Menara Perkebunan, 1958, 27: 151-5, bibl. 2, illus.

Three methods of wet processing coffee were used and in each case the product was dried in 3, 12, 24, 36 or 48 hours. The length of drying time had no effect on the dry weight.

Mangoes.

(See also 961a.)

896. YEE, W.

The mango in Hawaii.

Circ. Hawaii agric. Ext. Serv., 388, 1958, pp. 26, bibl. 14, illus.

The commercial development of the mango in Hawaii is handicapped by the erratic bearing of the main variety, Haden, by quarantine restrictions in the U.S.A. because of the mango weevil (*Cryptorhynchus mangiferae*, which is only a minor pest in Hawaii), and by the small size of the local market. Notes are provided on varieties, propagation by grafting, planting, pruning, manuring, bearing

abit, wind protection, marketing, and the control of pests and diseases.

97. LEDIN, R. B., AND MALCOLM, J. L.
Mango selection, propagation and culture.
A.R. Fla agric. Exp. Stats, 1956-57, pp. 348-9.

Counts of perfect flowers showed the same varietal rating in 2 successive years. The percentage fruit and fruit shedding were also studied with 9 varieties. In a fertilizer test Haden and Zill trees fertilized in winter, spring and summer continued to yield more than trees fertilized in spring, summer and autumn; Kent trees showed no difference in yield between these treatments. In experiments with young mangoes there was a definite response to N, sludge, nitrate of soda, sulphate of ammonia and ammonium nitrate being equally efficient as sources of N. Moisture availability rather than fertilizer was the most important factor determining growth rate.

98. RUEHLE, G. D., AND YOUNG, T. W.
Powdery mildew on mangos.
A.R. Fla agric. Exp. Stats, 1956-57, p. 344.

sulphur at 8 lb. and Karathane WD at 1 lb. per 100 gal. (included in anthracnose sprays) both gave satisfactory economic control of powdery mildew (*Pseudium* sp.) on mango flowers, when applied soon after the mildew appeared. Spraying after a satisfactory crop has set is probably not worth while.

99. SINGH, S. M.
Further studies in the control of mango malformation disease.
Sci. and Cult., 1957, 22: 394-5, bibl. 3.

malazinon, as a 0.032% spray applied only twice, gave useful control of the mites *Tyrophagus* *stellanii*, *Typhlodromus* sp. and *Eriophyes* sp., which cause mango inflorescence malformation. A proportionate increase over the control in the number of fruits harvested was not, however, obtained.—Govt Fruit Res. Stat., Saharanpur, U.P.

100. POPENOE, J., HATTON, T. T., JR., AND HARDING, P. L.
Determination of maturity of hard green Haden and Zill mangos.
Proc. Amer. Soc. hort. Sci., 1958, 71: 326-9, bibl. 6.

The starch content and specific gravity of hard fruit and the total soluble solids of soft fruit were closely associated with mango maturity as indicated by palatability. Direct measurement of the percentage of starch in the flesh was the best method found for estimating the degree of maturity of hard green fruit.—U.S.D.A., Homestead and Orlando, Fla. [See also *H.A.*, 28: 3095.]

Oil palms.

(See also 873.)

901. PEDERSEN, A. B.
Some notes on oil palms.
Planter, Kuala Lumpur, 1958, 34: 389-92, bibl. 2, illus.

It is recommended that seeds should be germinated in a "Congo chest", in which trays of seeds packed in either charcoal or coir dust are lowered into fermenting green material giving an optimum temperature of 39° C. in the seed boxes. The seed should be kept moist and will begin to germinate after 5-7 weeks. Individual 2-leaf seedlings should then be transplanted into baskets and, 3-4 months later, into the nursery. Alternatively, they can be transplanted into larger baskets, in which they can remain until planted out in the field at about 8 months. In this way bearing plants have been obtained in 3½ to 4 years. When harvesting, maximum extraction may be obtained by avoiding rotten bunches and by picking bunches that have at least 1 loose fruit per lb. estimated weight of the bunch.

902. MOREAU, C., AND MOREAU, M.
 Lignification et réactions aux traumatismes de la racine du palmier à huile en pépinières. (**Lignification and wound reactions in the roots of oil palms in the nursery.**)
Oléagineux, 1958, 13: 735-41, bibl. 12, illus.

Histological changes in root structure following breaking, wounding, restricting the downward growth, and the advent of "blast" disease are described in some detail.—Lab. Cryptogamie, Muséum nat. Hist. nat., Paris.

903. REES, A. R.
Field observations of midday closure of stomata in the oil palm, *Elaeis guineensis* Jacq.
Nature, 1958, 182: 735-6, bibl. 4.

Stomatal closure in oil palm leaves became slight or nil after rain, the extent of closure being correlated with total daily evaporation. Comparison of a watered and an unwatered palm during very dry weather showed a significant difference in midday closure, but this disappeared when the second palm was watered after 33 days. Watering significantly reduced the temperature of fully exposed leaflets and also, after a time, that of the air, the latter effect not being due to evaporation at soil level.—W.A.I.F.O.R.

904. BIENAYMÉ, A., AND SERVANT, M.
 Variations des caractéristiques des huiles de palme et notamment de leurs caroténoides. (**Variations of the characteristics of palm oils, particularly of their carotenoids.**) [English and German summaries ¾ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 336-53, bibl. 2.

Carotene contents and iodine indexes are given for palm oils from various races of oil palm from different parts of Africa and from Malaya. Seasonal fluctuations are discussed.—Inst. Rech. Huiles. Oléag., Paris.

Papaws.

See 961f.

Pineapples.

905. KANAPATHY, K.

Leaf analysis in relation to yield and quality of pineapples.

Malay. agric. J., 1958, **41**: 18-26, bibl. 2.

Using a leaf sampling technique based on a Hawaiian method, nutritional status was assessed in a potash fertilizer experiment. For the Singapore Spanish variety the analysis of the youngest fully grown leaf tips of mature plants, which had neither fruit nor flowers, indicated that maximum yields of good quality fruit would be associated with the following percentages: N = 1.2 ± 0.2 , P = 2.2 ± 0.3 and K = 32.0 ± 4.0 , and with a K/P ratio as near as possible to 14.

906. PY, C., AND OTHERS.

Influence des éléments minéraux sur la composition de l'ananas. (**Effect of mineral elements on the composition of pineapples.**) [English and German summaries 7 and 8 lines.]

Qual. Plant. Maveg., 1958, **3/4**: 237-43.

Experiments in French Guinea are described, involving factorial combinations of 0, 1 and 2 units each of N, P and K per plant, the N unit being 20 g. of ammonium sulphate, the P unit 6.7 g. of bicalcium phosphate and the K unit 13.3 g. of potassium sulphate. The sugar content of the fruit was only slightly influenced by the treatments. Acidity, however, decreased with increasing N, but increased with increasing K, the latter having the greater influence.—Stat. Cult. fruit., Foulaya, Kindia, French Guinea.

907. GOWING, D. P.

The induction of flowering in pineapple by exposure to short day length.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xix-xx.

Smooth Cayenne pineapple plants were induced to flower by exposure to 8-hour days. Interruption of the dark period by illumination suppressed the inductive effect. The recognition that the pineapple is a short-day plant may lend support to the hypothesis that NAA, in inducing flowering, acts as a competitive antagonist for the native auxin.—Pineapple Res. Inst. Hawaii, Honolulu.

908. GOWING, D. P.

An antagonism of indolebutyric acid for indoleacetic acid.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xx.

The flower-inducing properties of IBA in pineapple plants were inhibited by simultaneous application of IAA. It is concluded that IBA and IAA are not "auxin" in common in the flowering response, but that IBA, like NAA, acts by competitively lowering the internal effective IAA levels to within the flowering range.—Pineapple Res. Inst. Hawaii, Honolulu.

909. HUET, R.

Répartition de l'acide ascorbique, des acides et des sucres dans l'ananas (variété Cayenne lisse). (**Distribution of vitamin C, acids and sugars in the Smooth Cayenne variety of pineapple.**) [English and German summaries 7 and 8 lines.]

Qual. Plant. Maveg., 1958, **3/4**: 244-55, bibl. 2.

During the ripening of pineapples the proportions of vitamin C and total acids decrease while the sugar content increases. At the end of the dry season in French Guinea, large pineapples contain 0.2-0.3 g. of ethanol per kg. in their central tissues.—Stat. Cult. fruit, Foulaya, French Guinea.

Rubber trees.

(See also 960a, j, r, 961d, l.)

910. EVERS, E.

Valeur et comportement du matériel de plantation actuellement utilisé en hévéa-culture. (**Value and behaviour of planting material in present use in rubber growing.**)

Bull. Inf. I.N.E.A.C., 1958, **7**: 213-27, illus.

The results of a survey of the rubber growing areas of the Belgian Congo are presented, mainly in tabular form. They include yield data on the 5 commonest grafted clones and descriptions of the characteristics of 23 clones in use in the Congo. Recommendations are made regarding suitable material for future planting.

911. GAROT, A.

Seleksi hevea—tjara baru jang dipertjapa pada P.P.N. (**Rubber selection—a new method developed at the Central State Plantations.**) [English summary $\frac{3}{4}$ p.]

Menara Perkebunan, 1958, **27**: 139-50, illus.

The system described enables clones to be tested in about 8-10 years only. The first stage is the choice of mother trees. In the second stage small plots of budded clonal material are established between blocks of control clones in order to evaluate budding behaviour, early habit, vigour

disease resistance, etc. After 1-2 years sufficient budwood is available for stage 3, in which 2-ha. plots are field-tested, each plot being divided into 3 tapping systems.

912. ANON.

Tenggang tumbuh miring dan barisan pagar pada karet. (Concerning slanting growth habit and the hedgerow method of planting rubber.) [English summary 9 lines.]

Menara Perkebunan, 1958, 27: 179-84, bibl. 6, illus.

The slanting growth habit of certain clones, particularly LCB 1320, is discussed. With the hedgerow system of planting, high stumps (budded or seedling) should be used, and in Java the rows should be planted in a north-south direction, in order to increase the incidence of sunshine.

913. BEAUFILS, E. R.

Le diagnostic physiologique. II. Conception des recherches et méthodologie. Établissement de la méthode dans les plantations. (Physiological diagnosis. II. The basis of research and of the methods evolved. Use of the method on estates.) [English summary 10 lines.]

Rev. gén. Caoutch., 1958, 35: 922-8, bibl. 8.

For Part I see *H.A.*, 28: 4119. Part II reviews the basis on which the method has been established, that is by the interpretation of data from numerous samples taken from rubber plantations growing under natural conditions and not under any experimental regime. In this way standards of balanced physiological mechanism have been determined. This part also describes the method of sampling leaves and latex from relatively uniform subdivisions of a plantation, and the sample cards used for entering the data are illustrated.

914. BARLOW, G. B., AND PATRICK, A. D.

Uptake and utilization of DL-[2-¹⁴C] mevalonic acid by *Hevea brasiliensis*.

Nature, 1958, 182: 662-3, bibl. 8.

Mevalonic acid was taken up by 2-year-old hevea seedlings when applied as a solution in neutral phosphate buffer to the upper surface of leaves or to lightly scraped areas of the main stem. In the leaves the compound was converted to α -carotene, but in the stem it was converted to products unable to enter the path of carotene synthesis. It was not incorporated into rubber.—Dunlop Res. Centre, Erdington, Birmingham.

915. LAUW ING KOEN.

The durability of rubber sheets made from latex obtained from plantings treated with stimulants. [Indonesian and Dutch summaries 7 lines each.]

Arch. Rubb. Cult., 1958, 35: 25-35, bibl. 6.

A method is described for accelerating the ageing

of crude rubber. This was used to test sheet made from rubber from trees stimulated by a number of growth substances, with or without copper sulphate and boric acid. It was concluded that the ageing of rubber is not accelerated by the use of such stimulants.

916. RESING, W. L.

Preservation of hevea latex with ammonia and DMP-30. [Indonesian summary 8 lines.]

Arch. Rubb. Cult., 1958, 35: 37-49, bibl. 17.

Concentrated hevea latex can be effectively preserved with ammonia and 2,4,6-tri-(dimethylaminomethyl)phenol (DMP-30). The ammonia content should be 0.15-0.25%, the DMP-30 concentration 0.35-0.25%. Latex preserved in this way has a pH of 9.5-10.0 and is suitable for normal use, including production of foam rubber, but is rather sensitive to thickening in the presence of ZnO. [Author's summary.]

917. ANON.

Intensive tapping of mature rubber.

Plant. Bull. R.R.I.M., 1958, No. 38, pp. 106-12.

The following conclusions were drawn from experiments on intensive tapping: 1. Old unselected seedlings and buddings of low or moderate yield capacity can be tapped on a double cut system (2C/2.d/2.200%) for a prolonged period. No stimulation should be used except as a temporary measure to overcome the loss of yield on passing a virgin bark island, and during the last two years before cutting the trees out. 2. Old high yielding clones cannot be relied on to stand up to double cut alternate daily tapping for a long period. It is better to exploit the high yielding capacity of the virgin bark at high levels, initially by tapping on a single high cut. The evidence is that such trees can be tapped for 3 years at 200% intensity on a double cut system, or on a less intense system such as 2C/2.d/3.133% for a longer period, before cutting the trees out for replanting. Stimulation should only be used with double cut tapping as suggested above. It is known that high yielding clones tapped S/2.d/2.100% react favourably to yield stimulation. The method is best used when high cut tapping is done, but full advantage should be taken of the period of flush yield after opening the high cuts before applying the stimulant. Thereafter stimulant applications may be made at half-yearly intervals. 3. Young high yielding clones should not be tapped on a double cut system of more than 100% intensity, nor should they be treated with a yield stimulant. 4. Yield stimulant should not be applied to renewing bark above the tapping cut if the panel is to be tapped again in the future. Panel application, however, is preferable on trees being tapped in bark of second or older renewal. [From author's conclusions.]

918. TAN HONG TONG.

Results of tapping experiments in Polonia.
[Indonesian and Dutch summaries 1 p. each.]

Arch. Rubb. Cult., 1958, 35: 1-24, bibl. 3.

The results of trials carried out from 1933 to 1941 but hitherto not fully reported, are described. For the first 3 tapping years yields obtained from mild tapping methods and 100% tapping did not greatly differ, but during the next 8 or 9 years the differences increased, and with the least favourable methods yields became proportional to the number of tappings. Yields decreased at the change over to a higher and more or less isolated tapping panel. Girth increase depended on the tapping intensity and the extent of latex extraction, and also on the tapping system. Continuous tapping appeared to be less detrimental to the growth of the trees than periodical tapping.

Sugar cane.

(See also 357-360, 807, 960c, j, 961c.)

919. BIRKETT, L. S., AND OTHERS.

Field experiments with sugar cane, XXIV.
Sugar Bull. Brit. Guiana Dep. Agric. 24, 1956, pp. 101, bibl. 4 [received 1958].

Reports are included of variety trials, cultivation experiments, growth and ripening studies and fertilizer experiments. The recent history of leaf scald disease in British Guiana is also described. [For more recent reports on these experiments see *H.A.*, 28: 911, 918 and 924 and several abstracts below.]

920. BRETT, P. G. C.

Recent developments in sugarcane breeding and the present variety position in Natal.
Proc. 31st annu. Congr. S. Afr. Sugar Tech., 1957, pp. 138-42, bibl. 1.

Single stool seedling selection is less effective than small plots with numerous controls. It is expected that N:Co. 376 will largely displace Co.301 and Co.331.

921. FERNÁNDEZ DE ULLIVARRI, R., AND GUERINEAU, C. M.

Comportamiento fabril de algunas variedades de caña de azúcar en la provincia de Tucumán. (Industrial qualities of some sugar cane varieties in Tucumán province.)
Rev. industr. agric. Tucumán, 1957, 41 (2): 3-27, bibl. 2.

Yield and purity data are quoted for numerous varieties. Certain varieties are mentioned for resistance to mosaic and smut, to cold, to inversion of sugar during the interval between harvesting and milling, and to the adverse effects of early cutting.

922. SEGALLA, A. L., AND ALVAREZ, R.

Comportamento de variedades de cana de açúcar no arenito de Bauru. (Behaviour of sugar cane varieties in soil of the Bauru sand type.) [English summary $\frac{1}{4}$ p.]
Bragantia, 1957, 16: 35-43, bibl. 2.

In a statistical comparison of 16 varieties, grown as plants and 1st and 2nd ratoons on a sandy soil, Co.419, C.B.40/69, C.B.40/77, C.B.41/51, Co.290 and C.B.41/70 gave the highest yields of cane and sugar. Co.421 also yielded well but had hard, fibrous canes and showed a tendency to arrow. Unsatisfactory varieties included C.P.29/291, which proved very susceptible to smut.

923. BIRKETT, L. S., AND CAMERON, C.

Field experiments with sugar cane, XXVI. 1. Variety trials, 1957.
Sugar Bull. Brit. Guiana Dep. Agric., 26, 1958, pp. 2-55.

The recommended varieties for general planting are B.41227, B.37161 and B.47258. In trials B.49119 was outstanding as a strong ratooner but proved susceptible to leaf scald disease. B.47258, D.49/46 and D.141/46 continued to do well. [For part XXV, see *H.A.*, 28: 911.]

924. BIRKETT, L. S., AND CAMERON, C.

Field experiments with sugar cane, XXVI. 4. Cultivation experiments.
Sugar Bull. Brit. Guiana Dep. Agric. 26, 1958, pp. 75-6.

Yield figures are given for the plant cane crop of an experiment to compare normal estate cultivation with the Cameron-Williams cultivation method, in which alternate shallow gutters between beds are replaced by 2-ft. deep ditches to encourage the leaching out of excess salts. In this trial yields and quality were higher with the Cameron-Williams method. In a previous trial yield was increased but juice purity was less.

925. INFORZATO, R., AND ALVAREZ, R.

Distribuição do sistema radicular da cana de açúcar var. Co.290, em solo tipo terra-roxa-legítima. (Distribution of the root system of the sugar cane variety Co.290 in a soil of the true terra rossa type.) [English summary $\frac{1}{4}$ p.]

Bragantia, 1957, 16: 1-13, bibl. 9, illus.

The soil was deep, porous and fertile. The sugar cane roots reached a depth of at least 2.1 m. at 6 months and 3.3 m. at maturity. Growth was mainly downwards in the first 6 months, after which the development became dense in the uppermost 30-40 cm. The mass of living roots was greatest at 12 months and some roots died off between 12 and 18 months. Cane yield was 100 tons per ha., and estimated root weights were 1.8 tons per ha. at 6 months and 8 tons at 18 months.

926. BIRKETT, L. S., CAMERON, C., AND PAUL, H. **Field experiments with sugar cane, XXVI. 3. Fertilizer experiments, 1957.** *Sugar Bull. Brit. Guiana Dep. Agric.* 26, 1958, pp. 63-74, bibl. 2.
- Liming experiments.** Small, statistically insignificant yield increases resulted from lime applications which apparently increased the availability of P and K supplies in the soil, in addition to having other beneficial effects not yet fully understood.
- Relative value of various N and P fertilizers.** As in the plant cane crop there was a significant increase in first ratoon yield due to 141 lb. N/acre but no significant differences due to the source of N. Five different sources were used. No significant differences due to the type of P fertilizer used were observed. **Variety-fertilizer experiments.** In general, B.41227, B.37161 and D.37/45 appeared to be capable of utilizing larger quantities of N than B.4362 and B.4098. The present commercial varieties apparently possess higher N requirements than do those of the past.
927. DU TOIT, J. L. **Fertilizer responses.** *Proc. 31st annu. Congr. S. Afr. Sugar Tech.*, 1957, pp. 129-37.
- In a series of $3 \times 3 \times 3$ trials N and K responses were particularly high in ratoon crops. P dressings at planting showed useful residual effects on ratoons. Better yields resulted from splitting K applications to give half to the plant and half to the first ratoon crop than when all the K was applied at planting. N and P slightly depressed, whereas K either maintained or increased, sucrose contents. The increased use of P and K relative to N, which has been a feature of recent practice, is entirely justified by the results of these experiments.
928. HIREGOUDAR, H. V. **Some findings on the nutrition of sugarcane crop in Malnad tract of Dharwar division.** *Mysore agric. J.*, 1958, 33: 17-20.
- In one experiment responses over 3 years were obtained to 100 lb./acre P_2O_5 and to increasing doses of N up to 300 lb. In a second experiment there were no significant differences over 5 years between the responses to the same level of N applied in 6 different forms.
929. CLEMENTS, H. F. **Crop-logging of sugar cane: the standard nitrogen index and the normal nitrogen index.** *Tech. Bull. Hawaii agric. Exp. Stat.* 35, 1957, pp. 56, bibl. 15.
- In order to provide improved means of interpreting the leaf N readings in the crop-logging of sugar cane, a study was made of factors affecting the leaf N level of cane. Partial regressions on leaf N were determined for radiation, maximum and minimum temperatures, the total sugar level of the sheaths (Primary Index), sheath moisture and age. In general, of the factors studied, sunlight affects the leaf N readings the least while age and sheath moisture are dominant. For both irrigated and unirrigated cane the two factors, age and moisture, give as high a coefficient of determination as any combination of three or more factors, even though each of the other factors had partial regressions on leaf N which were significant. But where both irrigated and unirrigated cane are combined into a single study, it is necessary to add the factor maximum temperature to obtain the most completely satisfactory coefficient of determination. Equations are presented for normal N as well as for standard N for each of the varieties and for the various areas in Hawaii where cane is grown. The application of the normal N concept to actual plantation conditions is described in detail. The application of the standard N concept to experimental methods is described.
930. ALVAREZ, R., SEGALLA, A. L., AND CATANI, R. A. **Adubação nitrogenada na cana-de-açúcar. (Nitrogen fertilizing of sugar cane.)** [English summary $\frac{1}{4}$ p.] *Bragantia*, 1957, 16(Suppl.): XXIII-XXV, bibl. 3.
- Castor-bean cake and hoof-and-horn meal, applied in the furrows at planting at 30, 60 and 90 kg. N/ha., gave almost identical increases in cane yield over no-N, and were superior to ammonium sulphate, calcium cyanamide and urea. On one of the two soils involved there was no response to either ammonium sulphate or calcium cyanamide. Adequate P and K were applied in each case.
931. ALVAREZ, R., AND OTHERS. **Adubação da cana de açúcar. I. Adubação fosfatada em solo massapê-salmourão. II. Adubação fosfatada quantitativa. (Manuring of sugar cane. I. Phosphate fertilizing on massapê-salmourão soil. II. Quantitative phosphate fertilizing.)** [English summaries $\frac{1}{2}$ p. and $\frac{1}{4}$ p.] *Bragantia*, 1957, 16: 65-72, bibl. 3, and 297-302, bibl. 11.
1. On soil of low pH (4.5), cane yield was increased considerably by NK fertilizing, but much more markedly by NPK. Bone-meal was the most effective P source, followed closely by superphosphate. Bauxite containing P was the least satisfactory, and a local rock phosphate only slightly better. Various proprietary phosphates gave intermediate results. On the more fertile soils (pH 5.8 and 6.3) the local rock phosphate gave the lowest yields, and superphosphate, followed closely by bone-meal, the highest. [Massapê soils are deep, fertile clay loams. Salmourão soils are acid, sandy, and poor in fertility.]

2. On a terra-rossa soil [deep, fertile, purplish-red loam] superphosphate was applied at 0–240 kg. of P_2O_5 per ha. with constant N and K. The Mitscherlich exponential equation $y=66.23[1-10^{-1.023(x+0.3978)}]$ was a very good representation of the relationship between yield (y) and P_2O_5 application rate (x). The most profitable rate was judged from the yield curve to be 120 kg. of P_2O_5 per ha.

932. TABAYOYONG, F. T., AND BASILA, F. A.

On quantities of potash fertilizer.

Sugar News, 1958, **34**: 285-8, 310, bibl. 7.

Plots which received 150 and 200 kg./ha of K_2O outyielded 100 kg./ha. plots. Differences between 150 and 200 kg./ha. plots were statistically insignificant, but the most profitable cane and sugar yields were obtained when 200 kg./ha. were applied. The response of CP.29/116 to K_2O was significantly greater than that of H37-1933.

933. BIRKETT, L. S., CAMERON, C., AND GOMES, H.

Field experiments with sugar cane, XXVI.

2. Growth and ripening studies of the cane varieties B.41227, B.37161, D.158/41 and D.37/43. III. Second ratoon cycle.

Sugar Bull. Brit. Guiana Dep. Agric. **26**, 1958, pp. 56-62.

Yield curves for the 4 varieties, grown in 3 trials and reaped monthly over 5 months, are discussed. It is concluded that the factors which influence the yield of a given variety are: (i) age of cane at time of reaping, (ii) variability in number, category and growth rate of stalks, (iii) age at which arrowing occurs and its degree, and (iv) the rapidity with which growth decreases or is renewed. These factors taken in conjunction with the distribution and quantity of rainfall result in a perplexing number of inter-relationships between the crop and its environment.

934. COLEMAN, R. E.

Factors affecting the flowering of sugarcane.

From abstr. in *Plant Physiol.*, 1958, **33** (Suppl.): xx.

Attempts were made to induce flowering in several varieties under conditions in which they normally remain vegetative. Flower induction in 2 varieties was accomplished with a fixed photoperiod of 12 hrs 25 min. Infra-red irradiation inhibited flower initiation in one variety. It was found that one cane variety could be kept on non-inductive daylengths from July 15 to September 1, and flower induction could still be accomplished by exposure to inductive daylengths after September 1. Flowering in a normally non-flowering variety was not induced by 80% shade, but shade did not inhibit flower initiation in 2 other varieties. There was an indication that climatic conditions after September 1 may be responsible for flowering differences between 2 contrasting regions. In one test a soil factor was possibly inhibitory to flowering.

Foliar sprays of various growth regulators, anti-auxins and organic acids did not induce flowering under vegetative conditions.—U.S. Dep. Agric., Houma, La.

935. PARTHASARATHI, K., AND VIJAYASARADHY, M.
Fructose-glucose relation during vegetative and reproductive stages in sugarcane.

Curr. Sci., 1958, **27**: 257-8, bibl. 2.

Characteristic trends during growth in the relative concentrations of fructose and glucose in juices of Co.285 (early-flowering) and Co.290 (late-flowering) are presented. In Co.285 the percentage of fructose and glucose in the juice increased rapidly during the later vegetative stages and fell steeply during the arrowing stage. In Co.290 there was a longer period of vegetative growth during which the juices contained relatively high percentages of fructose and glucose. In both varieties the high sucrose percentage which developed during arrowing was associated with a rapid decrease in fructose and glucose, and the authors consider this change to be a very good indicator of the maturity of the cane.—Sugarcane Breed. Inst., Coimbatore. J.R.L.

936. CLEMENTS, H. F.

Quality in Hawaiian sugar cane.

Progr. Notes Hawaii agric. Exp. Stat. **115**, 1958, pp. 25.

Data are presented showing that considerable sucrose is deposited in mature internodes long after the leaves have fallen from them. A statistical analysis was made of factors affecting juice quality over a 5-year period. The measures of quality used were brix, purity, pol. in the juice and the tons cane/tons sugar ratio. Factors studied were the following: amount of trash at harvest; the average light, wind, maximum and minimum temperatures for the 90-day period prior to harvest; the sheath moisture levels for the periods in the crops, 12–18 months, the last 6 months, and the final sheath moisture; the leaf nitrogen levels for the 12–18 month period as well as the final leaf nitrogen reading; and lastly the age of the crop at harvest. For each of the juice quality categories used all 11 of the factors were studied, and those which showed statistically significant relationships were put into equations, which were then used to show the actual effect on quality of varying each factor. [From author's summary.]

937. TABAYOYONG, F. T.

Cane diseases and pests and their control.

Sugar News, 1958, **34**: 343-9.

The major cane diseases of the Victorias Milling District are considered; of these leaf scorch (*Stagonospora sacchari*) is the most serious and is best controlled by planting resistant varieties to replace H.37-1933. Stunting disease is also under observation and hot water and hot air treatments

are being used. The major pests are rats, woolly aphid (*Oregma lanigera*) and various borers. Woolly aphid can be controlled with Pestox; in an attempt to control dead heart borers (*Sesamia inferens*, *Argyroprocta schistaceana* and *Diatraea fuscicollis*) biologically large-scale releases have been made of several *Trichogramma* species. The results of experiments in the chemical control of these and other borers, scale insects and mealy bugs are reported.

938. STEIB, R. J., AND FORBES, I. L.

Hot air for the control of the ratoon stunting disease of sugarcane in Louisiana.

Abstr. in *Phytopathology*, 1958, **48**: 398.

Hot air was chosen instead of hot water to control the ratoon stunting disease after greenhouse and field tests proved it safer to use. An oven of 2,200 lb. capacity was made available to the industry after it was thoroughly tested. Performance tests of 60 ovens on farms were made in 1955 and 1956 with thermocouples. Oven operation was satisfactory during the required 8-hour period. An in-going temperature of 58° C. is required to give an oven air temperature of 54° C. Cane treated on various farms germinated well, and the disease was controlled to a high degree in most varieties. The level of control was not always 100%. A check of the second-year progeny (first ratoon) showed that the disease had spread very rapidly where a harvester had been used, the knives having become contaminated by the few diseased plants found in the plant cane. Plant cane found 2.1% infected showed 16% of the plants diseased in the stubble crop. From results of 2 tests using various temperature-time combinations, it appears that certain varieties may require a specific hot-air treatment for maximum disease control.

939. THOMSON, G. M.

Gumming disease of sugarcane in Natal.

Proc. 31st annu. Congr. S. Afr. Sugar Tech., 1957, pp. 143-8, bibl. 2, illus.

The symptoms and incidence of the disease, caused by *Xanthomonas vascularum*, are described. Variety Co. 310 is particularly susceptible. Serious outbreak appears to depend on abnormal weather conditions.

940. GUPTA, B. D.

An analysis of factors underlying heavy incidence of the stalk borer (*Chilo trazea auricilia* Ddgn.) in sugar cane.

Indian Sugar, 1958, **8**: 209-10, 217-18, 221-3, bibl. 1.

Comparison of conditions during an epidemic season with those of previous years showed that increased borer damage was associated with: intermittent and prolonged drought periods at the time of moth emergence and oviposition, resulting in heavy egg-laying during the 3rd to 5th

broods; (ii) heavy rainfall and waterlogging causing a very humid micro-climate, which favoured the caterpillars; (iii) lodging; and (iv) dressings of N at 100 lb./acre or over, which made the canes soft and succulent.—*Indian Inst. Sugarcane Res.*, Lucknow.

941. QUESTEL, D. D., GENUNG, W. G., AND BREGGER, T.

Studies upon the prevalence and control of the sugarcane moth borer in South Florida.

A.R. Fla agric. Exp. Stats, 1956-57, p. 246.

A survey during November in 47 fields showed parasitization of 25.6%, comprising 9% by *Lixophaga* and 16.6% by *Agathus*. Endrin was the best material for control of the lesser cornstalk borer, but cane stalk girth was reduced by treatment.

942. ANON.

Side loader handles 400 tons a day.

S. Afr. Sugar J., 1958, **42**: 653, illus.

Attached to a tractor, the loader holds a trailer in position with 2 arms and hauls a stack of cut cane onto it by means of a wire rope running through rollers above the driver's head to a winch in front of the tractor. The loader superstructure costs £500.

943. BIELESKI, R. L.

The physiology of sugar-cane. II. The respiration of harvested sugar-cane.

Aust. J. biol. Sci., 1958, **11**: 315-28, bibl. 29.

The respiration drift of harvested sugar-cane, variety Pindar, was similar to that of many fruits. Mechanical shock caused the respiration rate to rise over 16-24 hrs to a maximum of 80% above the initial rate; the rate returned to the initial value during the next 72-120 hrs. Corresponding changes occurred in the concentration of oxygen in the intercellular atmosphere. At death, only about 30% of the available carbohydrate had been used. Respiration reached a maximum rate between 37° and 45° C. Above 40° C. the respiratory system soon became permanently damaged. Respiration was not limited by the rate of diffusion of oxygen into the tissues. The concentration of oxygen in the intercellular spaces seldom fell below 8% at 25° C. The epidermis was not a major barrier to the diffusion of oxygen. [Author's summary. For Part I see *H.A.*, 28: 3126.]—*Bot. Sch.*, Univ. Sydney.

944. DEKKER, K. D.

A survey of the work done in S.A. on the direct analysis of cane consignments, with special emphasis on recent S.M.R.I. investigations.

S. Afr. Sugar J., 1958, **42**: 305-9, 573-7, bibl. 9, being *S.M.R.I. Bull.* 6.

A recent approach to the problem of direct samp-

ling and testing of individual consignments, other than by using the Java Ratio method, has been to test for fibre rather than trash. Samples are taken after the cane has passed the knives. A method of determining the sucrose content by a high speed extraction technique, which gives an average error much lower than that observed with the Java Ratio, is described. Certain difficulties, including that of sampling large numbers of individual consignments, have yet to be overcome.

945. RAMAIAH, N. A., VISHNU, —, AND CHATURVEDI, R. K.

Spectrophotometric method for estimation of calcium in sugarcane juices using ethylenediaminetetraacetic acid.

Curr. Sci., 1958, 27: 246-7, bibl. 2.

The authors have estimated the Ca^{++} in sugar cane juice of known specific gravity by treating it with lead subacetate, filtering, removing the excess lead with $\text{K}_4\text{Fe}(\text{CN})_6$, refiltering, adding ammoniacal copper sulphate solution and titrating with EDTA solution, and observing the changes on a spectrophotometer. The results compared favourably with those obtained by using the oxalate method but took only 30-40 minutes compared with 8-10 hours.—*Nat. Sugar Inst., Kanpur. J.R.L.*

Tea.

(See also 960e, j, l, m, s-v, 961m, 967, 971.)

946. UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

Annual Administration Report United Planters' Association of Southern India, Scientific Department Tea Section, for 1957-1958 and Proceedings of the Sixth Annual Conference, 1958, pp. 1-22 and 23-78, bibls, the last-named being *Bull. U.P.A.S.I.* 18.

In the report section progress is described on the following: *Entomology*: Control of *Helopeltis*, mites, thrips and other pests. *Soil chemistry*: Fertilizer trials, including the effects of ceasing to apply manures and of withholding P, NPK trials, trials of a soil amendment mixture, foliar application of NPK and B nutrition. *Botany*: Screening of fungicides for blister blight control, dieback of tea shoots, vegetative propagation, trials with gibberellic acid and herbicides. The proceedings of the annual conference include the following papers: Manuring of tea (with special reference to South India)—retrospect and prospect, by V. Jayaraman; Chemical composition of Indian tea (seasonal, regional and grade variations in South India black tea), by D. S. Bhatia and C. P. Natarajan; Rooting responses of tea cuttings, by K. S. Venkataramani [see abstract below]; and a discussion on a number of tea management problems.

947. VISSER, T., AND TILLEKERATNE, L. M. DE W. **Observations on the germination and storage of tea pollen and seed.**

Tea Quart., 1958, 29: 30-5, bibl. 8.

Pollen germinated well both in water and in 5-25% sugar solutions. Optimum viability (70% germination after 3 months storage) was obtained by storage at 32° F. and 40% R.H. Soaking seeds for 3-5 days and cracking or removing the shell speeded up germination, especially in the case of fresh seeds. Over 50% seed germination was obtained following 10 months storage at 100% R.H. and 32° F. It is thought that pre-dried seeds stored at deep-freeze temperatures would have a greater longevity.

948. VENKATARAMANI, K. S.

Rooting responses of tea cuttings.

Proc. 6th annu. Conf. U.P.A.S.I., 1958, being *Bull. 18*, pp. 52-61, bibl. 3.

The results of several preliminary trials include:—
1. *Soil pH*:—A sandy loam soil of pH 5.9 was treated with sulphuric acid or calcium hydroxide to provide 5 different pH values. At pH 5.39 10 out of 10 cuttings rooted within 12 weeks and at pH 4.46 6 out of 10. At pH values of 5.99, 6.30 and 6.70 no cuttings had rooted after 12 weeks. In the pH 5.99 soil the cuttings showed exceptional callus development and also produced shoots. In the pH 6.70 soil all the cuttings died within 12 weeks. *Growth substance treatment*:—Quick-dip treatment with IBA at 2.5 mg./ml. and with NAA+IBA both at 2.5 mg./ml. appeared to hasten rooting in both internode (single node) and leaf+node (two node) cuttings. *Polythene covers*:—Cuttings placed in a bed covered with a single bamboo lath frame over a polythene tent rooted and grew more rapidly than cuttings placed in a bed covered by a double layer of lath frames for the first 3 weeks and with a single layer thereafter; frequency of watering was also much reduced by the polythene tent.

949. VISSER, T., AND TILLEKERATNE, L. M. DE W. **Factors affecting the planting distance of tea.**

Tea Quart., 1958, 29: 36-44, bibl. 4.

In a review of information available from Indonesia, India and Ceylon, it is shown that the periphery of the bush produces a relatively small proportion of the total yield. The loss of $\frac{1}{4}$ — $\frac{1}{3}$ of the plucking surface along the periphery when the bushes touch each other causes a 20% decrease in yield over the first 4 plucking rounds following pruning but this is offset by a 70% increase over the next 4 rounds. Plucking below the table to check side growth around the periphery may increase yields considerably. Over periods of 12-14 and 6 years, a planting distance providing 5,000 bushes per acre gave 10% more yield than one providing 3,500 bushes per acre. Contour planting at 4-5 ft. $\times$ 2-2½ ft. in the row is recommended.

50. VISSER, T., SHANMUGANATHAN, N., AND SABANAYAGAM, J. V.
A note on the effect of different copper preparations on tea yield.
Tea Quart., 1958, 29: 45-6.
 Even copper fungicides, applied to tea in the presence of blister blight, had no significant depressive effect on yields in comparison with those of untreated controls.
51. S[MITH], A. N.
The use of sulphur in the treatment of insufficiently acid soils.
Quart. Circ. Tea Res. Inst. E. Africa, 1958, 1: 78-81.
 The experiments reported here, as well as earlier trials, showed that the application of sulphur to soil, such as that of hut-sites, only reduces pH to a sufficient soil depth if high doses of 4-6 tons/acre are applied, and in these cases the upper horizon becomes too acid for successful growth of tea.
52. VISSER, T., SHANMUGANATHAN, N., AND SABANAYAGAM, J. V.
Blister blight control in 1957 with respect to fungicidal formulation, application rates and yield.
Tea Quart., 1958, 29: 9-20, bibl. 18.
 Formulations of copper oxide and oxychloride of varying copper content as well as colloidal copper and copper-carbonate gave efficient control at 6 oz. or 8 oz. per acre. Applying these fungicides at 2 oz. or 4 oz. per acre throughout a moderately severe monsoon also afforded satisfactory protection in most instances (on tea in plucking). Coated dispersible powder formulations containing 12 and 16% copper and also three organic fungicides applied at 8 oz. were significantly less efficient than the standard 50% cuprous oxide at 6 oz. per acre. The total yields of the sprayed plots over the period concerned varied only insignificantly in most cases, irrespective of the fungicides applied or their rate of application. [From authors' summary.]
53. WITKAMP, A. B.
A trial to compare plucking by shears with hand plucking.
 G[OODCHILD], N. A.
A preliminary trial to investigate the effects of mechanical plucking.
Quart. Circ. Tea Res. Inst. E. Afr., 1958, 1: 74-6, illus., and 76-8.
 Both articles describe preliminary small scale trials: in one a pair of hand shears with an attached box was used, and in the other a modified Tarpen hedge trimmer. Both experiments showed increased early yields from mechanical plucking and no diminution in quality. Figures are given for the various types of leaf plucked. Larger scale trials are projected.
954. VISSER, T.
The validity of assessing tea yields on a basis of intermittent plucking and test plucking.
Tea Quart., 1958, 29: 21-9, bibl. 4.
 Yields estimated from 1 in 2, 3 or 5 pluckings did not differ significantly from absolute yields, but in experiments the margin between significance and non-significance became narrower, the fewer the pluckings on which records were based. As regards the test plucking of clones, the yields of 10 consecutive pluckings were highly correlated with the cycle yield, especially during the second year.
955. OPARINE, A. A.
 Travaux de l'Institut de Biochimie A. N. Bach dans le domaine de l'étude des tannins. (Work of the A. N. Bach Biochemical Institute on tannins.) [English and German summaries $\frac{1}{2}$ p. each.]
Qual. Plant. Maveg., 1958, 3/4: 456-67, bibl. [in Russian] 46.
 The tannins in tea are of the catechin group, and their content reaches a peak towards the end of July. They resemble vitamin P in action and are more potent in green than in black tea. Similar compounds occur in vines and wine. In the U.S.S.R. a process has been developed for obtaining vitamin P from old leaves of the tea plant unsuitable for tea production.—A. N. Bach Inst. Biochem., Acad. Sci., Moscow.

Sundry crops.

(See also 961e.)

956. TOURY, J., AND OTHERS.

Analyse de quelques plantes entrant dans l'alimentation des populations de l'A.O.F. (Analysis of some plants used as food by natives of French West Africa.) [English and German summaries 6 and 7 lines.]

Qual. Plant. Maveg., 1958, 3/4: 256-61, bibl. 6.

Leaves of baobab (*Adansonia digitata*), Guinea sorrel (*Hibiscus sabdariffa*), cassava, *Moringa pterygosperma*, *Cassia tora*, *Amaranthus spinosus* and *A. caudatus*, *Corchorus olitorius* and *Leptadenia lancifolia*, were rich in Ca and vitamin C. Leaves of high protein content were baobab, *Amaranthus* spp., peanut, *Cassia tora*, cassava, *Moringa pterygosperma* and cowpea (*Vigna unguiculata*). Fruits rich in vitamin C were *Detarium senegalense*, *Parinararia macrophylla* and cashew (*Anacardium occidentale*). Seeds rich in vitamin B components were *P. macrophylla* and *Parkia biglobosa*, the latter having also a high protein content.—Organ. Rech. Aliment. Nutrit. afr., Dakar.

957. VIALARD-GOUDOU, A., DARRIEUSSECQ, J., AND NGUYEN THI LAU.
Les vitamines du groupe B dans les aliments végétaux au Sud Vietnam. (**Vitamins of the B group in food plants of South Vietnam.**) [English and German summaries $\frac{1}{2}$ p. each.] *Qual. Plant. Maveg.*, 1958, 3/4: 426-31, bibl. 10.
Thiamin, riboflavin and nicotinamide contents are given for edible parts of 135 food plants, including root and tuber vegetables, sugar cane, seeds and nuts, leafy vegetables, fruits, ferns and fungi.—*Éc. nat. Méd. Pharm.*, Tours, and *Inst. Pasteur*, Saigon.
958. FLOCH, H.
Les fruits à carotène guyanais. (**Guiana fruits rich in carotene.**) [English and German summaries 4 and 5 lines.] *Qual. Plant. Maveg.*, 1958, 3/4: 327-35, bibl. 8.
Carotene and vitamin A contents are given for 6 species of palm fruits, *Annona cerisea*, *A. squamosa*, Cayenne almond (*Terminalia catappa*), cashew fruit and nut, *Diospyros philippensis*, guava, hog-plum (*Spondias dulcis*), jackfruit (*Artocarpus integrifolia*), *Lucuma rivicola*, mango, orange, papaw, passion fruit (3 species), sapodilla (*Achras sapota*) and West Indian cherry (*Malpighia punicifolia*). The highest values (over 50,000 international units of vitamin A per 100 g.) were found in fruits of the palms *Mauritia flexuosa* and *Astrocaryum vulgare*, the latter having the thicker pulp and also containing 20–37% of oil. All the other fruits contained less than 8,000 units per 100 g.—*Inst. Pasteur*, French Guiana and Inini.
959. FLOCH, H.
À propos de la "cerise des Antilles" (*Malpighia punicifolia* L.) et ses propriétés alimentaires. (**The Barbados cherry (*Malpighia punicifolia*) and its nutritive properties.**) *Qual. Plant. Maveg.*, 1958, 3/4: 178-83, bibl. 15.
Green fruit of one variety in French Guiana have shown as much as 5,600 mg. of vitamin C per 100 g. of pulp. Data are also given on sugar content and acidity.—*Inst. Pasteur*, French Guinea and Inini.
- Noted.*
960.
a ANON.
New greenhouse for latex research. *Rubb. Develop.*, 1958, 11: 77-8, illus.
Details of a greenhouse being built in England to accommodate 5 rubber trees under tropical conditions.
- b ANON.
Ensete cultivation in the Southern Highlands of Ethiopia; a review. *Trop. Agriculture Trin.*, 1958, 35: 302-7, bibl. 8, illus.
Cultivation and uses of *E. ventricosum*, with notes on associated crops and stock.
- c ANTONOWITZ, J.
An analysis of the Java Ratio. *Proc. 31st annu. Congr. S. Afr. Sugar Tech.*, 1957, pp. 39-41.
Disadvantages outweigh advantages.
- d BERGERET, B., AND MASSEYEFF, R.
La vitamine C dans les fruits et légumes du Sud-Cameroun. (**Vitamin C in fruits and vegetables of southern French Cameroun.**) Composition chimique de quelques aliments peu connus du Cameroun. (**Chemical composition of some little known foods of French Cameroun.**) *Qual. Plant. Maveg.*, 1958, 3/4: 192-201, bibl. 21, and 202-9, bibl. 6.
- e BOKUČAVA, M. A.
The scientific basis of a new method of producing black tea [Russian, with English summary $\frac{1}{2}$ p.] *Izv. Akad. Nauk S.S.S.R., Sér. biol.*, 1958, No. 4, pp. 463-70, bibl. 15.
Manufacture.
- f CARVALHO, A., AND ANTUNES, H. (FILHO).
Genética de *Coffea*. XXIII. Interação dos fatores "sépalas desenvolvidas" e "calycanthema", em *Coffea arabica*. (**Genetics of *Coffea*. XXIII. Interaction of the factors "developed sepals" and "petaloid calyx" in *Coffea arabica*.**) [English summary $\frac{1}{2}$ p.] *Bragantia*, 1957, 16(Suppl.): XI-XIII, bibl. 3.
- g COCONUT RESEARCH INSTITUTE OF CEYLON.
Bats, rats and porcupines and their control. *Leafl. Coconut Res. Inst. Ceylon* 29, 1958 pp. 3.
Provisional recommendations, including explosives, poison baits and wire netting.
- h COCONUT RESEARCH INSTITUTE OF CEYLON.
Paradichlorobenzene in the control of termites in planting holes. *Leafl. Coconut Res. Inst. Ceylon* 30, [1958] pp. 2, illus.
Precautions to avoid damaging coconut seedlings.
- i COCONUT RESEARCH INSTITUTE OF CEYLON.
Control of insect pests of the coconut palm. *Leafl. Coconut Res. Inst. Ceylon* 31, [1958] pp. 4.
Provisional recommendations for controlling 6 pests.

- j COMMONWEALTH ECONOMIC COMMITTEE.
Plantation crops.
[Publ.] *Commonw. econ. Cttee*, 1958, pp. 178, H.M.S.O., Lond., 5s.
World production, trade, consumption and prices of sugar, tea, coffee, cacao, spices, tobacco and rubber.
- k DAVIS, T. A., AND ANANDAN, A. P.
The first root of the coconut.
Indian Coconut J., 1957, **10** (2): 9-14, bibl. 3, illus.
Macroscopic description of first root from the seed.
- l D[UTTA], S. K., G[LOVER], P. M., AND S[HARMA], K. N.
The manuring of young tea.
Ser. Tea Res. Inst. Tocklai 9/3, 1958, pp. 8, diagrams.
Detailed advice on quantities and method of application.
- m DZHORBENANDZE, G.
Tea-growing methods in the U.S.S.R.
Plant. Chron., 1958, **53**: 301-2.
- n ENTWISTLE, P. F.
Mealybugs II—Biology with special reference to cacao.
Ghana Fmr, 1958, **2**: 64-9, illus.
For part I, see *H.A.*, 28: 4156 l.
- o FENWICK, D. W.
Red ring of coconuts—a problem for the nematologist.
Span, 1958, No. 2, pp. 5-7, bibl. 7.
A review, with special reference to experience in Trinidad [see also *H.A.*, 28: 3069].
- p GANGOLLY, S. R., NAMBIAR, M. C., AND PANDALAI, K. M.
Home of the coconut.
Indian Coconut J., 1956, **10** (1): 3-11, bibl. 43, [received 1958].
Various theories reviewed; S.E. Asia considered the most probable.
- q GANGOLLY, S. R., SATYABALAN, K., AND PANDALAI, K. M.
Coconut breeding—a review.
Indian Coconut J., 1957, **10** (2): 32-48, bibl. 36, illus.
- r GAROT, A.
Petundjuk tentang menanam dengan bidji² karet di kebun. (Instructions on the planting of rubber seed in nurseries.) [Indonesian, with English summary 10 lines.]
Menara Perkebunan, 1958, **27**: 103-5, illus.
Watering with 0.5% ammonium sulphate solution at planting is advocated.
- s GLOVER, P. M.
The scope for mechanisation in tea production in North East India.
Tea Rubb. Mail, May 22, 1958, reprinted in *Plant. Chron.*, 1958, **53**: 297-300.
With particular reference to plucking and pruning hedge-planted areas.
- t GOKHALE, N. G., AND BHATTACHARYYA, N. G.
Effect of prolonged ammonium sulphate treatment on the calcium status of a tea soil.
Emp. J. exp. Agric., 1958, **26**: 309-13, bibl. 16.
See *H.A.*, 28: 1972 and 1973 for other accounts of this work.
- u JUDENKO, E.
Trials with a method of assessment of infestation caused by shot-hole borer (*Xyleborus fornicatus* Eich.) on old tea.
Tea Quart., 1958, **29**: 51-9, bibl. 10.
The method described is suitable for use in field experiments and surveys.
- v KING, W. C.
Tea in Brazil.
Foreign Agric., 1958, **22** (10): 21, illus.
Acreage now over 2,000, and a research station established near Registro, São Paulo.
- w LENTNER, C., AND DEATHERAGE, F. E.
Phenolic acids in coffee.
Chem. Ind. Lond., 1958, No. 41, pp. 1331-2, bibl. 11.
A chromatographic investigation of green and roasted coffee.
- x MARAR, M. M. K., AND KUNHIRAMAN, C. A.
Observations on a twin coconut palm.
Indian Coconut J., 1957, **10** (2): 3-8, bibl. 4, illus.
Differences small, apart from leaf spirals being in opposite directions.
- y MENDES DA PONTE, A.
Possibilidades da cultura do café arábica no distrito do Moxico. (Possibilities of growing arabica coffee in the Moxico district [of Angola].)
Rev. Café portug., 1958, **5** (17): 53-65.
- z MISSINGHAM, L. J.
These growers market bananas in winter.
Qd agric. J., 1958, **84**: 497-500, illus.
Planting dates and sucker selection when pruning for the ratoon crop.
961.
a NANDI, D. L.
Chemical constituents of different varieties of mangoes (*Mangifera indica*).
Sci. and Cult., 1958, **23**: 618-19, bibl. 1.
Acidity, sugars, vitamins, etc., in fruit of 6 varieties when ripe and 1 when half-ripe.

- b PANDALAI, K. M., SANKARASUBRAMONEY, H., AND MENON, K. P. V.
On the use of sunnhemp (*Crotalaria juncea*) as an indicator plant for potassium and calcium deficiency in coconut soils.
Indian Coconut J., 1956, **10** (1): 17-27, bibl. 24, illus. [received 1958].
Analysis and trials show sunnhemp to be a useful indicator plant.
- c PIRES, J. A.
Leaf scald ratings of sugar cane varieties in British Guiana.
Sugar Bull. Brit. Guiana Dep. Agric. **26**, 1958, p. 95.
Tabulated information on numerous local and introduced varieties.
- d POLHAMUS, L. G.
L'hévéaculture en Amérique latine. (Rubber growing in Latin America.) [English summary 15 lines.]
Rev. gén. Caoutch., 1958, **35**: 1024-31, illus.
Described country by country.
- e RAGHAVAN, V.
On certain abnormal male flowers in arecanut (*Areca catechu* Linn.).
Sci. and Cult., 1957, **22**: 460-3, bibl. 2, illus.
Eight types varying in frequency of occurrence from 1 to 10% described.
- f SAWANT, A. C.
A study of the interspecific hybrid, *Carica monoica* × *C. cauliflora*.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 330-3, bibl. 7.
Shows early flowering and hybrid vigour.
- g SCHMITZ, G.
Quelques observations effectuées dans le Nord du Congo belge sur les épïcampoptères ennemis des caféiers. (Some observations made in the northern Belgian Congo on *Epicampoptera* spp. attacking coffee.)
Bull. Inf. I.N.E.A.C., 1958, **7**: 261-6, illus.
Lead arsenate and DDT effective against these leaf-eating caterpillars.
- h SOMASEKHAR, P.
Pests of coffee and their control.
Indian Coffee, 1958, **22**: 220-46, illus.
Insect and nematode pests and control measures and equipment described.
- i SUBRAMANIAN, C. K.
Studies on marketed copra and coconut oil
Indian Coconut J., 1956, **10** (1): 12-16 [received 1958].
Including main characteristics of copra and oil.
- j UNDERWOOD, G. E.
A study of the non-caffeine nitrogenous compounds of coffee.
Diss. Abstr., 1958, **18**: 1603-5, being *Publ.* 25,453 of 87 pp.
The protein fraction of the bean, including data on 13 amino acids.
- k VERGHESE, E. J.
Copra grading.
Coconut Bull., 1958, **12**: 235-9, bibl. 1.
Standards used in India, Ceylon and Fiji.
- l WASSINK, J. T.
Menjusun skema untuk pembaharuan tanaman bagi perkebunan² karet-sec. (Planning the replanting of rubber estates.)
Menara Perkebunan, 1958, **27**: 31-7, reprinted in *English Ibid.*, 1958, **27**: 93-8, and in *Planter, Kuala Lumpur*, 1958, **34**: 401-6.
Choice of areas and working out a programme.
- m WEBSTER, B. N.
Reducing the cost of blister blight control.
Span, 1958, No. 2, pp. 34-5, illus.
Notes on organization of knapsack spraying gangs and reducing copper concentrations.
- n YUST, H. R.
Rufous scale on robusta coffee in Ecuador.
J. econ. Ent., 1958, **51**: 404, bibl. 2.
Selenaspidus articulatus controlled by 1.5% oil+1.5 lb. of 15% parathion w.p. in 100 gal.

NOTES ON BOOKS AND REPORTS.

Books.

(See also 77, 169m.)

962. AKENHEAD, D.
Horticulture in the British Commonwealth.—An outline, 1958.

Tech. Commun. Bur. Hort. Plant. Crops, E. Malling, **26**, 1958, pp. 63, 10s. or \$1.50.

This is a fully indexed work of reference designed to provide the reader with easy and rapid access to skeleton information on: (1) Crops and problems

interesting the horticulturist in different lands; (2) places where work on particular problems is in progress; and (3) leading horticultural and experimental centres in individual countries. It has been compiled with the help of notes supplied by the Bureau's Official Correspondents and others in 36 countries of the British Commonwealth and in the Republics of Ireland and the Sudan. No claim is made to completeness, but if, as is hoped, the publication proves useful, other and fuller editions will no doubt appear from time to time.

963. BLACK, C. A.

Soil-plant relationships.

John Wiley & Sons, New York, and Chapman & Hall, Lond., 1957, 9×6 in., pp. 332, bibls, illus., 56s.

This book is essentially a review of the present state of knowledge of the effects of soil factors on the performance of crop plants. The subject is divided into nine headings:—soil composition; soil water; soil aeration; exchangeable bases; soil acidity; soil salinity and alkalinity; nitrogen; phosphorus; and potassium. In each section the relevant facts about soil properties are first set out concisely to serve as a basis for an account of observed plant responses.

From the preface it appears that the book is based on a course of lectures given by the author at Iowa State College, and the level of presentation "is intended to be suitable for students who already have attained some knowledge of soils, plant physiology, and the basic sciences at the undergraduate level". The book will also be found useful by most research workers concerned with the responses of crop plants to soil conditions, because: (a) the author is concerned with general principles rather than with the problems of a particular area, and has illustrated his points with examples from work on a wide range of agricultural and horticultural crops in many parts of the world; (b) apart from the clear statement of well-established principles, alternative current theories on various aspects are usefully set out and discussed; (c) references are given to many recent papers, and no means all American.

Though no work of this kind can ever be regarded as complete, the author and publishers are to be congratulated on this well-written and well-balanced integration of much recent work, widely scattered in the literature, with the previous body of knowledge.

D.W.P.G.

964. CADILLAT, R. M., AND OTHERS.

Les agrumes de la Méditerranée et les marchés européens. (Mediterranean citrus and European markets.)

Editions Pierre Roehrich, Casablanca and Paris, 1958, 12½×9½ in., pp. 365, illus., 6,000 fr.

This large, glossy and eye-catching book has been produced through the collaboration of a number of commercial enterprises and public bodies established in Mediterranean countries where citrus is produced. It is resplendent with photographs—mostly topographical and illustrating the producing and consuming countries—and also with attractive paintings in the modern manner. The book, however, is sterner and provides a wealth of valuable information on the subject. The book is divided into four parts. The first provides a review of production in the Mediterranean area and also

of present and future European consumption. The next section describes in individual detail the main producing countries, mostly from the commercial angle. Each article has German and English summaries. The third section will prove of most interest to the horticulturist as it deals with technical problems such as varieties, diseases and pests, packing and transport. Lastly, the chief importing countries are individually considered and there are most useful statistical and other data on imports, prices, regulations and similar matters. The whole volume is clearly intended for commercial rather than horticultural use, and it will prove invaluable to all who are concerned with the citrus trade either as producers or consumers. Nevertheless, the grower and advisory officer who may wish to know something of citrus activities in other lands will also find this attractive production of considerable interest and of value as a reference book.

G.E.T.

965. CLAPHAM, A. R., TUTIN, T. G., AND WARBURG, E. F.

Flora of the British Isles. Illustrations.

Part 1. Pteridophyta — Papilionaceae.

Cambridge University Press, 1957, 11½×8½ in., pp. 144, illus., 25s.

This first companion volume to *Flora of the British Isles* [see H.A., 22: 3176] covers the Pteridophyta, Gymnosperms and certain families of Dicotyledons. The species follow the same order as in the *Flora*, and the illustrations by Sybil J. Roles, which are arranged 4 to a page, consist of very clear sets of line drawings. A most welcome feature is the inclusion of a scale for each reduction and enlargement.

966. CRAMER, P. J. S. (Edited by WELLMAN, F. L.).

A review of literature of coffee research in Indonesia from about 1602 to 1945.

Misc. Publ. Inter-Amer. Inst. agric. Sci. Turrialba 15, 1957, 10½×8½ in., pp. 262, bibl. and author index pp. 43, subject index pp. 37.

The first half of this century was a period of great progress by the Dutch in tropical agriculture, and P. J. S. Cramer was one of the outstanding men responsible for these achievements. He went to Java in 1905 and spent the greater part of his life there, working on various plantation crops, but he will probably best be remembered for his studies on variability and selection in coffee. From 1942 to 1945 he was a prisoner of war, but fortunately during some of that period he was allowed sufficient access to libraries to enable him to write this book. Thereafter it remained in manuscript for some years until finally, some time after Cramer's death in 1952, it passed into the hands of Dr. F. L. Wellman of Turrialba, who edited and indexed it and saw to its publication.

In this book Cramer has brought together and summarized in clear English an immense amount of literature, most of it written originally in Dutch, which few coffee research workers outside Indonesia can read. If this were all he had done, his contribution would be of lasting value, but in fact he has also drawn fairly extensively on research and experience in other lands to fill in gaps and to present a balanced picture.

His material is arranged in 29 chapters, 13 of which are concerned in one way or another with coffee species and hybrids and their characteristics, variability and improvement. Other chapters cover historical aspects, cultural practices, growth, diseases (notably *Hemileia* rust) and pests, generative and vegetative propagation, the shade problem, the finished market product, by-products and details of production and trade.

As a work of reference this book should be invaluable, but the really keen coffee research worker, who may be tempted to read through it from cover to cover, may find the typewriter print used rather trying on the eyes. G.K.A.

967. EDEN, T.

Tea.

Longmans, Green & Co., London, New York and Toronto, 1958, 8½ × 6 in., pp. xvi + 201, bibl., illus., 35s.

This book adds notably to the literature of a highly developed subject. All stages of the growing and the manufacture of tea are dealt with lucidly and succinctly. In most books on husbandry, including crop monographs, current practice with its ecological and other variants is the basis of presentation. Dr. Eden's concern has been to set forth principles, limiting description to what is necessary for this. Principles in agriculture are best seen in wide comparative study, and long experience in both Ceylon and East Africa (and visits to other tea regions) underlies this exposition.

Thoroughly experienced managers of tea estates, already familiar with much of the factual matter, may wish that on some things, for instance, use of the C.T.C. machine, discussion were wider. They will, nonetheless, be stimulated by the penetrating account of essential objectives and principles. For the less experienced a most valuable and attractive presentation of basic information and theory is provided. Scientific workers on tea need, for their profit and their pleasure, a good general knowledge of the wide field of "tea". It is available here, including the intriguing branches of marketing, tasting, blending and trade. There are things to quarrel with. Tea environments are very varied, and art and subjective opinion, in field and factory, still rule in many matters in spite of years of fruitful research in several countries. But the author never leaves an issue so undecided as to give no lead to practice. He commendably holds that

"the duller books are those that try to conceal the author's point of view".

Manuring of tea involves fertilizers, organic manures, crop residues, green crops and the complex influences of shade trees. It is brilliantly handled. Pruning and plucking, treated together, though planters sometimes tend to think of them separately, are most informatively and effectively related to the plant's carbohydrate and water economies. The great change in outlook on soil cultivation for tea, attributable entirely to research on this and other crops, is well brought out. It would have been an enhancement if more space could have been found for weed control problems, including diversity of practice even among adjacent gardens.

Of the seriousness and wide prevalence of drought damage insufficient seems to be said. Recent weather pattern studies in East Africa have brought out the importance of precise choice of locality for tea growing in areas of marginally sufficient rainfall and have provided valuable criteria. From some recent reports from Central Africa and records from the Terai and Dooars (N.E. India) it may seem doubtful whether the risk of a high density of planting (p. 40) is duly allowed for, especially with hedge planting. The assumption (p. 41) that "transpirative and evaporative losses from the vegetation and soil, when the area is uniformly covered by a vegetative crop, do not vary excessively from species to species and crop to crop" seems to be threatened by recent work on other crops in Britain and in East Africa. On the inexhaustible topic of shade trees there is a very good, brief, analytical essay on ecological effects with somewhat brief references to the interplay of nitrogen manuring and shade. Of diseases and pests of tea there are very good descriptions with well rendered illustrations.

Tea manufacture—four processes of great sensitivity and subtlety—is dealt with in twenty pages, which are a particularly good example of technical writing. Each process and its equipment are described in outline and, so far as knowledge allows, scientifically explained. Scientific readers may feel that the treatment of "tea tasting" passes too lightly over the notorious difficulty of assessing the quality of small, experimental samples, particularly from unusual bush types or manufacturing procedures.

Economics are outside the chosen range of the book. For the tea industry's dominating technical problem, namely re-planting (and in some cases new planting), the primary considerations are, however not economic but scientific. On the one hand there are the useful life of a bush population and the soil treatment between uprooting and replanting. On the other there is the choice of planting material. Science has not penetrated far into these matters but in the selection and characterization of clones

and in the development of inter-clone hybrids both research and practical trial stand at a higher level than the author's presentation suggests. Many clones outstandingly good in specific characteristics have been produced. How to use them in practice— singly or in variously assorted mixtures or by seed from inter-clonal hybrids—is now a pressing question on which the author's views would have been welcome. To suggest that it should have carried a few more pages is but to re-inforce the commendation of a very good book.

F.L.E.

968. ELLIOTT, F. C.

Plant breeding and cytogenetics.

McGraw-Hill, New York, Toronto, and London, 1958, 9×6 in., pp. 395, bibls, illus., 66s.

This well illustrated and beautifully produced book covers a very wide field, ranging from the more specialized aspects of cytogenetics, such as aneuploid analysis and chromosome substitution, to the administrative details of national organizations for plant improvement. In addition, Professor Elliott has been concerned to fill gaps in the background knowledge of the advanced students and plant breeders for whom the book is primarily intended. The result is a long, somewhat disjointed text varying as greatly in level of presentation as in content.

Chapter 1 (55 pp.) deals at a low level with heredity and environment, flower structure, pollen and egg formation, pollination mechanisms, incompatibility and the like. The last two chapters (38 pp.) describe, respectively, methods for releasing and maintaining quality in new varieties, and the various organizations for plant improvement in America and Europe. These three chapters could very easily have been compressed considerably or omitted entirely, in favour of expanding the chapter on disease resistance and of including an account of breeding for resistance to pests. This is an important aspect of plant breeding has been omitted, except for a reference to Painter's book on the subject.

The remaining chapters are those likely to prove of most interest to plant breeders and students of applied genetics. Aspects of plant breeding dealt with include: a well-illustrated, simple account of meiosis and the effects of structural and other chromosomal abnormalities on meiosis and breeding behaviour; an excellent review written in conjunction with Dr. R. A. Nilan, of the nature and of spontaneous and induced mutations; an account of polyploidy in crop plants, methods of colchicine treatment for a number of species, and uses of induced allopolyploidy in plant breeding; an up-to-date account of chromosome substitution and aneuploid analysis; the classical and newer systems of breeding for improvement

in self- and cross-fertilized crops; and finally an account of testing new varieties before release.

The author has quoted extensively from the literature on a wide range of crops, although quite naturally, many of the examples are drawn from the cereals. References are up to date (including several to work published in 1957) and are usefully assembled at the end of each chapter. Plant breeders are notorious for their tendency to concentrate exclusively on their own crops; they will be grateful to Professor Elliott for summarizing so much data on the newer techniques employed successfully by cytogeneticists and plant breeders in other fields, and for indicating the authorities to consult concerning the basic concepts underlying modern plant breeding methods. E.K.

969. GALET, P.

Cépages et vignobles de France. Tome II. Les cépages de cuve. (Vines and vineyards of France, Vol. II. The wine grape varieties.) École nationale d'Agriculture de Montpellier, 1958, 8½×5½ in., pp. 671-1655, bibl. pp. 18, illus., 3,600 fr. post free.

Volume I of this valuable and comprehensive work deals with the American vines, both as rootstocks and direct producers [see *H.A.*, 27:1967]. In Volume II, dealing with varieties used for wine making, the important viticultural regions of France are considered separately: the Mediterranean, East, East-Central and North-East regions, each divided into several districts. The climate and water supply are described for each district. Then follows a list of the main varieties grown locally, with synonyms and detailed descriptions; in many cases line drawings of leaves are given as an aid to identification. Tables show the area under vines and the amount of wine produced annually since 1788. Other information presented for each district includes the severity of the phylloxera epidemic and its consequences, the origin and quality of local wines, and outstanding vintages. The extensive bibliography is arranged under regional headings, and the index gives reference to names of varieties, places and wines. Volume III will deal with table grapes. P.R.-D.

970. GARNER, R. J.

The grafter's handbook.

Faber & Faber, London, 2nd edition, 1958, 8½×5½ in., pp. 260, bibl. 143, illus., 25s.

Ten years have passed since *The Grafters Handbook* first saw the light. The new edition shows that age has by no means withered it, nor it seems has custom staled the author. His infinite variety of grafts is more infinite than ever, and he is still grafting away or telling others how to do it (in the nice horticultural sense of course) with unabated verve and enthusiasm, all over the place at home and abroad.

It might be thought that the first edition was so

complete that little remained to be said. The author declares that since then many new methods and devices have appeared, hence the need for a new edition rather than yet another reprinting. Among the new features are the double shield budding technique to overcome incompatibility, the cotyledon-stage graft, growing-point grafting and ways of handling delicate tissues. Sections in the first edition on the use of nurse-root grafts to aid the establishment of shy rooting cuttings and of grafting to curtail vigour and increase fruiting, as well as some of the notes on plant surgery, have been extended.

This should suffice to show those possessing the first edition that it will pay them to obtain the second. The displaced copy would not long go a begging in gardening circles. The many explanatory line drawings, all by the author, are exceptionally clear and without an unnecessary line. He is fortunate in possessing a talent, which renders the most complicated processes readily understandable. He has too the gift of lucid exposition, which makes the book exceptionally easy to read, and it is not necessary to be even a potential grafter to enjoy it.

G.St.C.F.

971. HOČOLAVA, I. A.

Tea technology. [Russian.]

Piščepromizdat, Moscow, 1955, 9×6 in., pp. 278, bibl. 132, illus., 11.25 roubles.

This book is intended for engineering and technical workers in the tea industry and may also be used by students of universities and technical colleges as a textbook. It consists of 9 chapters. The first and second deal with the botanical characteristics of the tea plant and the composition of the leaf. Chapter 3 is concerned with the cultural requirements for the production of good quality tea leaf, and considers such factors as pruning, manuring, and methods of plucking and mechanical harvesting. The 4th chapter deals with the handling of the raw material between harvesting and processing, and the 5th classifies types of tea and gives some production figures. In the 6th chapter, which occupies more than half the book, the processes employed in the manufacture of black tea are dealt with *seriatim*. Next 2 short chapters are devoted to green leaf- and green brick-tea production, and the book closes with a brief appreciation of the indigenous teas of Russia.

E.U.

972. HUTCHINSON, J., AND DALZIEL, J. M., revised by KEAY, R. W. J.

Flora of West Tropical Africa. Vol. I. Parts I and II.

Published on behalf of the Governments of Nigeria, Ghana, Sierra Leone and the Gambia by the Crown Agents for Oversea Governments and Administrations, London, 1954 and 1958, 10×6½ in., pp. 295 and 296-823, bibls, illus., 25s. and 55s.

This is the second edition of the *Flora of West Tropical Africa* by J. Hutchinson and J. M. Dalziel which appeared during 1927-1936 and is now being revised at the Herbarium, Royal Botanic Gardens, Kew, by the present author. It represents a considerable enlargement of the original work. Parts I and II of Vol. I cover the Gymnospermae, Chlamydospermae and the first 122 families of the Dicotyledons. Part I also contains an historical account of botanical exploration in West Africa.

973. KNIGHT, R. L., AND KEEP, E.

Abstract bibliography of fruit breeding and genetics to 1955, Rubus and Ribes—a survey.

Tech. Commun. Bur. Hort. Plant. Crops, E. Malling, 25, 1958, pp. 254, bibl. 1,007, 45s. or \$6.80.

The publisher's note introducing this detailed abstract bibliography reads as follows:—In compiling this manuscript the needs of practical fruit breeders, working with currants, gooseberries, raspberries, blackberries and hybrid berries, have been the first consideration. Being themselves fruit breeders, the authors have abstracted the relevant data from a wide range of literature, some of which would not normally be covered by abstracting journals dealing with this aspect of horticulture. (Specialist abstracting journals in this field have existed for less than thirty years.) Papers and reports bearing on the breeding, genetics, and cytology of *Rubus* and *Ribes* have been summarized in detail, but the field has also been extended to include pomological descriptions, the classification and synonymy of varieties and species, and their disease and pest response. In addition, gene lists and linkage data are given in appendices. Papers dealing solely with the systematic botany of these two genera have been included by title only. In all, over 1,000 abstracts and titles, arranged alphabetically under authors, are included in the manuscript, and these have been indexed in considerable detail.

974. MIEHE, H., AND MEVIUS, W.

Taschenbuch der Botanik. Erster Teil: Morphologie, Anatomie, Fortpflanzung, Entwicklungsgeschichte, Physiologie. Zweiter Teil: Systematik. (Pocket book of botany. Part I: Morphology, anatomy, reproduction, ontogeny, physiology. Part II: Taxonomy.)

Georg Thieme Verlag, Stuttgart, 17th and 12th revised editions, 1959, 9½×6½ in., pp. 291 and 195, illus., D.M. 12.80 and 15.

In Part I of this well-known book the main revision has been the replacement of some illustrations by newer and clearer ones, including the addition of electron-photomicrographs. In Part II the sections dealing with the lower plants have received particular attention, and terminology has been simplified to some extent in floral morphology. In this part also there has been special revision of

the illustrations. [For previous editions, see *H.A.*, 5: 4459 and 23: 4735.]

975. RUHLAND, W., AND OTHERS (Editors).
Handbuch der Pflanzenphysiologie. Band X. Der Stoffwechsel sekundärer Pflanzenstoffe. (Encyclopedia of plant physiology. Vol. 10. The metabolism of secondary plant products.) Springer-Verlag, Berlin, Göttingen and Heidelberg, 1958, 10×6½ in., pp. xiv+834, bibls, illus., DM. 198.

The subject matter of this volume is divided into sections as follows:—1. Introduction. 2. Terpenoids (ethereal oils and resins, plant sterines, carotenoids, rubber and latex). 3. Wax, cutin and cutan. 4. Anthocyanins, flavones and xanthones. 5. Tannins. 6. Lignins and lignification. 7. Hydrolyzable aromatic compounds and other benzene derivatives. 8. Special compounds of lichens. The bulk of the volume is in German, but the sub-sections on carotenoids, rubber and latex, and wax, and sections 4, 6, 8 and most of 7, are in English. For earlier volumes see *H.A.*, 27: 975 and 4008, and 3197 and 3198.]

976. SHEWELL-COOPER, W. E. (Editor).
The fundamentals of gardening. Seeley, Service & Co., London, 1958, 8½×6 in., pp. 304, bibls, illus., 25s.

The Ullswater Library is to issue a series of authoritative works on practical horticulture, of which this is the first. If those that follow are of equal merit the series should be valuable. The present volume is concerned with the basic problems on which horticulture depends, and it seems that if all the Top People, past and present, in scientific horticulture have been rounded up to assist. Sir Bernard Keen and Sir John Russell write on soil, F. A. Bush on digging and hoeing, Jeanour Sinclair Rohde on not digging or hoeing, Albert Howard on composting, F. A. Knight on propagation, W. Dallimore on pruning, D. E. Green and G. Fox Wilson on pests and diseases, B. Dawson on lawns, G. Crosbie Taylor on various garden "props", hedges, paths and so forth, and wherever there is a gap the indefatigable editor leaps competently in to fill it. This is no book-written gardening book. The Olympians have come among us (at a very reasonable price too) and we should be grateful. They have presented us with a blend of scientific and practical horticulture, which must prove of lasting value and interest to those to whom gardens mean something more than a place one passes through on the way to the station.
G.St.C.F.

977. STAPP, C.
Pflanzenpathogene Bakterien. (Plant pathogenic bacteria.) Paul Parey, Berlin, 1958, 9½×7 in., pp. 259, bibls, illus., DM. 32.

Once upon a time, not so very long ago, up-to-date

textbooks in the field of bacterial plant diseases were almost non-existent. Erwin Smith was the last to rise to the occasion with his *Introduction* published in 1920, but in the years that followed no one showed very much inclination to follow suit. In recent times all inhibitions on the subject of exposition seem to have been thrown to the winds, and today there flourish no less than three detailed works, the latest being the present book, Dr. C. Stapp's *Pflanzenpathogene Bakterien*.

Dr. Stapp is a man of considerable experience in this field and could probably claim, without exaggeration, to be one of the major exponents of his craft. The publication of his book is therefore a notable event. The first part is devoted to the magical subject of technique. In it he describes the preparation of special and general culture media and the various routine tests used for the characterization of plant pathogenic bacteria, such as staining reactions, flagella arrangements and biochemical activities. There is also an account of serological methods, and he touches, extremely lightly, on the possible use of specific bacteriophages for the identification of the different pathogenic species. He concludes with a brief discussion of classification and nomenclature. Here he adopts Bergey's system, and thus sets the seal on its more or less universal adoption, at least for the time being.

The rest of the book, that is about three-quarters of it, is concerned with individual pathogens arranged in alphabetical order. Details are given of their diagnostic features, the disease symptoms they cause, host range and resistance, geographical distribution and control measures. A bibliography is given after each account; this is a welcome change from the rather tiresome continental practice of grouping references, *en bloc*, at the end of the book.

What Dr. Stapp has done, he has undoubtedly done well, but readers in the far flung corners of the world will be disappointed to find that he has restricted himself to a choice of 24 pathogens said to be of special interest to workers in central Europe. One might perhaps have expected a little less insularity from an authority of international repute. This is a criticism of the scope rather than the content of the book. There is much in it of high quality, and it should be available to all interested in plant bacteriology, including those domiciled outside central Europe.

There are 100 illustrations scattered through the text and a detailed subject index at the end. The book is produced by Paul Parey which, as everyone knows, is a guarantee of quality. J.E.C.

978. THIMANN, K. V. (Editor).
The physiology of forest trees. Ronald Press Company, New York, 1958, 9×6 in., pp. 679, bibls, illus., \$12.

This book contains the papers delivered with subsequent discussions at a symposium held at the Harvard Forest in 1957 under the auspices of the Cabot Foundation. The 35 papers are divided into 9 subjects, viz. water relations and sap movement, photosynthesis, general biochemistry, mineral nutrition, phloem transport, root growth, other growth phenomena, photoperiodism and thermoperiodism, reproduction. Most of the papers are concerned with forest tree species, but the following also contain information that is of direct horticultural interest: *Nitrogenous compounds in tree xylem sap* by E. G. Bollard, in which much of the data presented relates to apples; *The physiology of maple sap flow* by J. W. Marvin; *Photoperiodic control of growth and dormancy in woody plants* by R. J. Downs, which contains data obtained from ornamentals; and *Experimental control of tree growth and reproduction* by K. Sax.

979. TIDBURY, G. E.

The bulk harvesting of orchard fruit.

Dig. Bur. Hort. Plant. Crops, E. Malling, 1, pp. 38, bibl. 72, illus., 5s. or 80 cents.

It is hoped that this *Digest* will be the first of a series of publications in which practical as well as experimental progress on a wide variety of subjects is reviewed. The aim will be to produce publications, in as plain English as circumstances permit, which are of interest and value to the grower and advisory officer as well as to the research worker. This aim was very much in mind when the present *Digest* was prepared. The subject is one that is arousing widespread interest in many countries, but the information so far available on it is scattered and often inaccessible. The more important developments in bulk harvesting are here described and illustrated in some detail with the help of overseas experts. Apples, cherries and citrus receive particular attention. A short account is also given of developments, still largely in the experimental stage, in the handling of other orchard crops and grapes.

Annals and reports.

(See also 785.)

980. ANON.

Where to buy everything for agriculture and horticulture, No. 9, 1958-9.

"Where to Buy" Ltd., John Adam House, 17-19 John Adam Street, London, W.C.2, 1958, pp. 156, 5s.+8d. postage.

The sub-title to this annual directory is "an index for the trade to the principal sources of supply of farm and horticultural requisites, implements, machinery, chemicals, feeding stuffs, fertilizers, plants, trees, seeds and sundries". Although the use of the word "everything" in the title is perhaps rather over-optimistic, the extensive list of equipment and materials, arranged in alphabetical order

with the names and addresses of the manufacturers or suppliers of each item, should be of help to many people in this country and overseas. A long list of trade names, with an indication of what each name stands for and who produces it, should also help materially to bring some order out of confusion.

981. BRITISH COLUMBIA.

Fifty-second Annual Report of the Department of Agriculture, British Columbia, 1957, 1958, pp. 104.

Horticultural Branch (pp. 17-28): Demonstration work on strawberry botrytis control; asparagus fertilizers and irrigation; tree fruit fertilizers; weed control in vegetables and fruits; seal oil as a deer repellent. *Plant Pathology Branch* (pp. 29-30): Reduction of low-temperature and wind damage to strawberries by an oat cover-crop; apple scab control with Cyprex; bean rust control with zineb, ziram or Cyprex.

982. BRITISH GUIANA.

Annual Reports of the Director of Agriculture for the years 1955 and 1956, 1958, pp. 66 and 69, cyclostyled.

Investigations reported include: *Sugar cane*: variety testing, cultivation and fertilizer experiments, growth and ripening studies, diseases and pests. *Coffee, citrus and coconuts*: manurial experiments.

983. CEYLON (CHANDRARATNA, M. F.).

Administration Report of the Director of Agriculture for 1957. Part IV—Education, Science and Art (C), 1958, pp. 86, Rs. 2.15+35 cents postage.

Investigational work reported includes the following: *Botany Division*: vegetable breeding and fertilizer trials; tobacco fertilizer trial and selection of varieties resistant to leaf curl. *Horticultural Division*: pineapple experiments, including effects of shade and mulching; citrus rootstock influence on composition and growth; cashew variety trial; banana nutrition; papaw variety trial. *Plant Pathology and Entomology Divisions*: citrus decline; cacao diseases; vegetable pests. *Botanic Gardens*: orchid breeding.

984. C.S.I.R.O., AUSTRALIA.

Ninth Annual Report of the Commonwealth Scientific and Industrial Research Organization for year 1956-57, Canberra, 1957, pp. 179, 10s. 6d.

Work reported includes: *Plant nutrition*. The effect of several micronutrients on the free amino acid content of tomato plants. *Fruit investigations*. The effect of growth substances applied at full bloom on fruit cell division and fruit size. Diphenylamine for control of apple scald. The Venturi Scubber with low O₂ storage was tested under commercial conditions. Preliminary trials on hop defoliation by maleimides have shown little result.

tea and sugar-borax sprays were applied to Nathan and Granny Smith. *Tobacco investigations*. Breeding for blue mould resistance. Severity of blue mould increased in plants approaching flowering, when leaves were kept moist. A detached, starving tobacco leaf showed a respiratory characteristic during yellowing. The effect of K nutrition on yields and on quality after curing. *Irrigation at Merbein*. 2,4-D as a fruit setting spray gave better quality Zante currants than IPA. Sultana yields proved to be related to hours of spring sunshine 17 and 29 months before harvest, and to mid-winter temperatures 7 months before harvest; they were significantly increased by sulphate of ammonia applications in late May/early July and in early September; creosote applications in mid-May or mid-June for weed control also increased them. Nematode- and disease-resistant tomato varieties are being bred and tested. *Irrigation at Griffith*. The adverse effect of N on citrus fruit quality was related to deficiency, and in grass sod and bare soil treatments quality was improved by superphosphate applications. When the laminae of tomato plants were at incipient moisture stress, metabolic changes were greatest in the lower leaves. K levels in peaches, apricots and prunes were lowest in trees adversely affected by flood rains and waterlogging. New Washington Navel orange cuttings were exposed for a brief period to high salinity, analyses showed that while K was highest in actively-growing parts, Na was evenly distributed throughout the plant. *Entomology*. Biological control of weeds and pests. *Food*. Fruit and vegetable storage and processing. *Atmospheric physics*. Artificial rain formation.

55. CYPRUS (ALLAN, W.).

Annual Report of the Department of Agriculture for the year 1957, 1958, pp. 67, cyclostyled.

Investigations on horticultural crops include: *Flower*: varietal and spacing trials. *Deciduous fruit trees*: mulching experiments, rootstock protection, varietal and rootstock studies on pears. *Grapes*: N and P fertilizer experiment. *Olive*: fertilizer trial. *Strawberry*: varietal studies. *Citrus*: pre-harvest fruit drop, Zn deficiency, pest control. *Pine*: variety collection. *Pistachio*: variety collection. *Vegetables*: use of cloches for early production, sprouting control in onions.

56. DIRECTIE VAN DE LANDBOUW, 'S-GRAVENHAGE.

Tuinbouwkundig Onderzoek, Jaarverslag 1957 (Horticultural Research, Annual Report, 1957), Ministry of Agriculture, The Hague, pp. 327.

This report is a brief outline of the more important results of horticultural research in the Netherlands during 1957. Results which are provisional, are

classified according to subjects, viz. fruit, vegetables, bulb flowers, cut flowers and pot plants, raising woody plants, herbs and tobacco, seed production, and beekeeping. Reproduction of any part of the contents requires the permission of the Director of Horticulture.

987. F.A.O.

Yearbook of Food and Agricultural Statistics, 1957, Vol. XI, Part 2, Trade. [English, French and Spanish.], Rome, 1958, pp. 308, \$3.50, or 17s. 6d.

Statistics are presented for world trade in agricultural produce for the years 1954, 1955 and 1956, together with averages for 1934-38 and for 1948-52. Trade figures for some of the major non-reporting countries are also included.

988. FLORIDA.

Annual Report of Florida Agricultural Experiment Stations for the fiscal year ending June 30, 1957, pp. 397, illus.

Work in progress in the departments, branch stations, and laboratories is summarized. Many aspects of growing and marketing citrus, vegetables, ornamentals, tobacco, pecans, tung, strawberries, vines, fibres, avocados, sugar cane and mangoes are considered [see separate abstracts].

989. HEIDELBERG.

Jahresbericht der Staatlichen Lehr- und Versuchsanstalt für Gartenbau, Heidelberg, für das 4. Tätigkeitsjahr 1957. (4th Annual Report of the State Horticultural College and Experiment Station, Heidelberg, for 1957), 1958, pp. 97, illus.

Reports on the following subjects are included: *Fruits*: Variety trials with strawberries, black and red currants, raspberries, apples, pears, and sour cherries. *Plant protection*: Pest and disease control on top and soft fruits, vegetables and ornamentals. *Town waste*: Its use in frames and its effects on several vegetables. *Vegetables*: Trials with glasshouse lettuce; cucumber growing in a roof-ventilated dutch-light structure; and general variety trials. *Ornamentals*: Variety trials with chrysanthemums, forcing roses, carnations, hydrangeas, *Primula obconica*, *P. malacoides*, *Begonia semperflorens*, *B. gracilis* and asters; studies on factors affecting hydrangea flower colour; and forcing annuals and woody ornamentals. *Economics*: Of glasshouses and frames.

990. HELLYER, A. G. L. (Editor).

Amateur Gardening Diary, 1959. Collingridge, London, 1958, 7½ × 5 in., pp. 160, 7s. 6d.

An invaluable pocket or tool shed book for the English gardener. Tells him where to get information, implements and plants and what to read in his spare time, and, of course, provides him with a diary and work calendar.

991. HELLYER, A. G. L. (Editor).

Amateur Gardening Annual.

Amateur Gardening, Tavistock St., London, W.C.2, 1958, pp. 136, illus., 6s.

The annual contains its usual assortment of short attractive articles on subjects of particular interest to the amateur gardener. This year's issue includes a brief but clear introduction to the way in which atomic energy can be, and is being, put to use in gardening problems. Its other articles are equally up to standard.

992. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.

Jaarb. TuinbTech., 1958/59. (*Yearbook of Horticultural engineering, 1958/59*), Inst. Tuinbouwtech., Wageningen, 1958, pp. 304, illus., fl. 5.

Information on the latest developments in horticultural engineering has been collected and is presented as short articles or notes. There are 8 sections, viz. glasshouse construction, heating and ventilation, electricity, tractors and machines, spraying and dusting, harvesting and grading, work studies and miscellaneous.

993. I.R.S.I.A.

Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture. Rapport annuel. Exercice 1957. (*Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1957*), Brussels, 1958, pp. 231.

Brief summaries are included of the following research programmes:—The use of isotopes in agricultural research. Production of vegetables for canning, including herbicides for haricot beans, asparagus and spinach, fertilizer placement for beans, bean anthracnose, and responses of spinach to gibberellic acid. Interrelationships between endogenous growth substances, photoperiod and root production in plants. Interrelationships between chlorophyll metabolism, photoperiod and sex expression. The effect of gibberellic acid on flowering of vegetables in relation to photoperiod and β -indoleacetic acid. Thermoperiodism in tomatoes. Strawberry selection, growing, pest and disease control. Fruit and vegetable storage. Electrical soil heating. Hop selection, disease control and propagation. Vine breeding, rootstocks, pest and disease control.

994. LONG ASHTON.

Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, for 1957, 1958, pp. 181, bibls, illus.

As in the past most of this report consists of short research papers, many of which are abstracted separately. Other papers not so treated are concerned with the preparation or bordeaux mixture, ecological studies on apple and pear scab

fungi, a description of a compressed air nozzle for small-volume spraying; investigations on the performance of a power knapsack mist sprayer, a study of the activity of pectin methyl esterase in black currants, and an account of the quality, sale and utilization of cricket bat willow trees (*Salix alba* var. *caerulea*) grown at Long Ashton.

995. LUDDINGTON (N.A.A.S.).

Report of the Luddington Experimental Horticulture Station, Stratford-on-Avon, Warwickshire, for 1957, 1958, pp. 112, illus.

Fruit Section. Apple variety trial. Apple rootstock trial. Plum bacterial canker stembuilder trial. Soft fruit variety trials with black currants, red currants and gooseberries. Control of big bud and red spider on black currants. *Vegetable Section:* N.I.A.B. vegetable variety trials. Club root control on brassicas with aldrin. Asparagus spacing, strains and weed control. Tainting of carrots and lettuce by gamma-BHC and aldrin. Irrigation trials on cauliflowers, lettuces, carrots and celery. Nutrition of beetroot, runner beans, leeks and cabbages. *Intensive Cultivation Section:* Lettuce varieties and uncovering dates. Dwarf bean varieties and sowing dates. Self-blanching celery spacing/N levels and lifting dates. *Glasshouse Section:* Chrysanthemum: control of flowering by light and shade. Cyclamen: effect of pot size and fertilizers. *Flower Section:* Gerbera strains and propagation. Early chrysanthemum propagation. *Meteorological experiments:* Shelter screens for lettuces. *Experimental technique.* Measurement of depth of rooting of plants. Screening of trees in an orchard against sprays. Adjustment of plot area to make conversion figures easy.

996. MALAYA (HEATH, R. G.).

Annual Report of the Department of Agriculture, Federation of Malaya, for 1956, 1958, pp. 115, illus., \$2.50.

Progress in investigational work on the following subjects is included: *Cacao:* selection and breeding, fermentation studies, pest and disease control. *Citrus:* fruit quality studies. *Coconuts:* breeding and selection, pest control, manurial trial. *Coffee:* agronomic studies. *Derris:* selection. *Guavas and other minor fruits:* preservation. *Oil palms:* breeding and selection, nutrition experiments, pest and disease control. *Pineapples:* breeding and selection, nutrition and composition studies, pest and disease control, canning research. *Rambutan:* preservation, pest control. *Tea:* selection, pest and disease control, fertilizer trial. *Vegetables:* manurial trial, pest and disease control.

997. MASSACHUSETTS.

Annual Report of Massachusetts Agricultural Experiment Station, 1955-1957, 1957, pp. 70, being *Bull.* 494.

Among studies described in abstract form are the

flowing: *Agricultural Economics*: Labour efficiency in production, and marketing of greenhouse ornamentals. *Agricultural Engineering*: Refrigerated fruit storage. *Agronomy*: Tobacco breeding, and plant bed preparation. *Botany*: Control of apple blight; control of parsnip diseases; breeding for resistance to *Cladosporium* leaf mould of tomato; control of peach canker; control of geranium diseases; diseases of carnations and their control; chemical treatments for controlling the diseases of forced lilies, and their effect on production and quality. *Entomology*: Control European red mite, onion thrips, plum curculio, apple maggot, cabbage maggot, pests of shade trees and ornamental shrubs; control of insects on cucurbits in relation to yield and quality. *Landscape Architecture*: Seed control in nurseries; factors increasing the productivity of growth of nursery stock; hardiness of rhododendrons and azaleas in New England. *Tree Laboratories*: Tree diseases. [See also separate abstracts in sections on Tree fruits, Small fruits, Vegetables and Floriculture.]

98. NEW ZEALAND, DEPARTMENT OF AGRICULTURE.

Annual Report of the Department of Agriculture for the year ended 31 March 1958, Wellington, 1958, pp. 161, 5s. 6d.

The report of the Horticulture Division covers pp. 93-115, and gives information on production figures, cultural methods, pest and disease control, and other aspects of growing top and soft fruits, citrus and other subtropical fruits, vines, hops, tobacco, vegetables and ornamentals. Trials at Levin Horticultural Research Station have continued with fruits, rose rootstocks and glasshouse tomatoes. At the Horticultural Trial Area, Erikeri, new citrus introductions are being tested. Insect post tests with cabbages and carrots, carrot fly control, and variety trials with rock melons and cabbages are being carried out at Avondale.

99. NEW ZEALAND, D.S.I.R.

Annual Report of the Department of Scientific and Industrial Research for the year ended 31 March, 1958, Wellington, 1958, pp. 90, 3s. 6d.

The Secretary's Report (pp. 13-38) are briefly summarized the results of the year's work, including the following: *Fruit research*: In lines of Sturmer apples known to store well, fruit cells were smaller in fruit of poorer keeping quality. In studies of metabolism it was shown that inorganic N was changed to organic N in the roots, and that most N is translocated in the xylem. *Tobacco research*: Foam and allyl alcohol have shown promise for seed control in seed beds. Stem rot and collar rot are controlled by the application to seed beds of a slurry of ferbam or thiram. More efficient heat sterilization during flue-curing has been obtained by circulation of preheated air in the kiln. *Blotchy*

ripening of tomatoes: High atmospheric humidity for a period of several days may lead to a high incidence of blotchy ripening and high levels of watering increase the effect of high humidity. The critical stage of fruit development is at the start of ripening. Low light intensity at the critical period of ripening increases the incidence of infection. *Current projects* are listed under the various branches which include the Crop Research Division, Entomology Division, Fruit Research Division, Hop Research Station, Plant Chemistry Division, Plant Diseases Division, Tobacco Research Station and Cawthron Institute.

1000. NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.

Investigations, 1958-59, 1958, pp. 56.

Variety trials carried out in 1957 with small fruits, chrysanthemums, tomatoes, peas and onions grown from sets are briefly reported. Leaf spot (*Ramularia primulae*) of primulas has been controlled by thiram. Machines are being designed for the precision seeding of turnips and for thinning root crops. [The same information is given in the second part of the *Calendar, 1958-59, 1958*, pp. 116.]

1001. PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.

Jaarboek, 1957. (*Yearbook of the Phytopathological Service, Wageningen, 1957*.)

Meded. PlZiekt. Dienst. 132, 1958, pp. 132, illus.

Horticultural crops. Severe virus infection in geraniums reduced flower and shoot production by 50%. Weeds in gladiolus were controlled by pre-planting treatment with a contact herbicide, plus a post-planting application of CIPC at 4-6 l./ha. Weed seedlings in hyacinth beds were successfully controlled by CIPC, at 4-6 l./ha., applied shortly after the winter cover had been removed. Rust (*Uromyces croci*) on crocuses was successfully controlled by an organic mercury dip, and partially controlled by hot-water treatment. A combined hot-water treatment containing insecticidal wettable powder gave almost complete control of narcissus fly (*Lampetia equestris*). *Eriophyes psilaspis* on *Taxus* was controlled by a summer spray of parathion, repeated after 3 weeks if necessary, and also by winter oil sprays. Soil fumigation with DD (60 c.c. per sq. m.) was successful for the control of nematodes (*Pratylenchus* sp.) in strawberries. Sprays or dusts of TCNB gave excellent control of *Cladosporium cucumerinum* on cucumbers. Heptachlor applied twice to young plants at 2 l./ha. reduced cabbage root fly attack. Control of *Pegomya hyosecyami* on spinach with Diazinon or Dipterex was effective when these were applied as soon as the damage was observed. CIPC was phytotoxic to both summer and winter spinach, but 4-6 l./ha. CIPC applied to onions 2-2½ weeks

after emergence gave good weed control. *Rhizoctonia solani* on *Digitalis purpurea* was controlled by mercury sprays. *Studies on plant protection materials*. Plant injury by organic phosphorus compounds. Rodent control studies are also in progress.

1002. ROSEWARNE (N.A.A.S.).

Third report of Rosewarne Experimental Horticulture Station and Ellbridge Substation, 1957, Camborne, 1958, pp. 94.

Much of the work reported on bulbs, anemones and brassicas has been abstracted separately. Other work of interest includes the following:—Breeding work on broccoli, including vegetative propagation for the maintenance of clones and for seed production. Variety trials with apples, small fruits, tomatoes and chrysanthemums. Types of cloches for strawberries. Chrysanthemum propagation. Rotations and vegetable production under mobile glass, frames and cloches. Nutrition of beet, runner and broad beans, calendulas, polyanthus and violets. Anemone spacing. Studies of run-of-wind in various situations on the Station.

1003. SARAWAK (COOK, J.).

Annual Report of the Department of Agriculture for the year 1957, 1958, Government Printer, Kuching, pp. 53, illus.

Foot-rot disease of pepper is caused by an organism resembling *Phytophthora hibernalis*. The Sarikei or "small leaf" variety appears to be less prone to foot-rot than the Kuching or "large leaf" variety. Reference is also made to the progress of the Rubber Planting Scheme started in 1956.

1004. SUMMERLAND, BRITISH COLUMBIA.

Summary of Annual Reports, Summerland, B.C., for 1956, 1957, pp. 20, and *for 1957*, 1958, pp. 28.

Brief progress reports are made on work by various units of the Experimental Farms Service and the Science Service on diseases, pests, tree fruits, vegetables, nutrition, irrigation and soil management.

1005. TANGANYIKA.

Annual Report of the Colonial Pesticides Research Unit, Arusha, Tanganyika, East Africa for 1957-1958 (Progress Report No. 22), Dar es Salaam, 1958, pp. 35, Sh. 3/50.

Reports are included of research on:—Coconuts: *Pseudotheraptus wayi* control. Coffee: persistence of insecticides on the leaves, spreading of a copper fungicide on the leaves, couch grass control, tests of machines for fungicidal sprays. Seed beans: treatment with insecticide against bean fly. Pyrethrum: weed control. Tropical soils: persistence of insecticides.

New or changed periodicals.

1006. CONFOEDERATIO INTERNATIONALIS AD QUALITATES PLANTARUM EDULIUM PERQUIRENDAS, AND INTERNATIONAL COMMISSION FOR PLANT RAW MATERIALS.

Qualitas Plantarum et Materiae Vegetabiles [Qual. Plant. Maveg.], formerly *Materiae Vegetabiles* [Maveg.], 1958, Vols III/IV, 9½×6 in., pp. 610, illus., Uitgeverij Dr. W. Junk, Den Haag.

From Vol. III onwards, this periodical is appearing under its new title and with an increased scope, now including the biochemistry and nutritional value of edible plants and plant products. This double volume, priced at 72 Dutch guilders, presents brief notes on the 1st and 2nd international conferences on plant quality, an exposition of the concept of plant quality, and notes on two international societies, one for research on tobacco, the other for the study of fats and oils. The bulk of the volume consists of papers, the majority in French, a few in English, German or Italian, grouped in sections as follows:—1. Proteins and amino acids; 2. Vitamin C; 3. Carotenoids; 4. Various vitamins; 5. Tannins and anthocyanins; and 6. Mineral nutrition. Many of these papers are abstracted or noted separately.

1007. RHODES INDUSTRIAL SERVICES LTD.

Pest technology, pest control and pesticides. [Pest Technol.], 1958, Vol. I, No. 1, 10½×8½ in., pp. 32, illus., from Rhodes Industrial Services Ltd., 274-276 The Corn Exchange, Fennel St., Manchester, 4, 65s. per annum or 6s. per number.

In the editorial to this new monthly publication there is a plea that all sectors of pest control production from research to commercial application should be regarded as the "Pesticides Industry". It is hoped that *Pest Technology* will help towards this end by covering problems and other aspects of both the production and use of pest control materials. Among articles in this first issue is one on the discovery and development of DDT and another on British developments in the aerial application of plant protection materials and fertilizers.

Noted.

1008.

a AUSTRALIA.

Thirty-fourth Annual Report of the Commonwealth Dried Fruits Control Board for year 1957-58, 1958, pp. 26.

b BASUTOLAND.

Annual Reports of the Department of Agriculture for 1956 and 1957, pp. 68 and 69, both illus.

BRITISH HONDURAS.

Annual Report of the Agricultural Department, for the years 1956 and 1957, pp. 38 and 53.

Includes some experimental work on tobacco, sugar cane, pineapples and coconuts.

CANADA, NATIONAL RESEARCH COUNCIL.

41st Annual Report National Research Council of Canada, 1957-58, being N.R.C. No. 4783, pp. 54 English, 60 French.

CYPRUS DEPARTMENT OF AGRICULTURE. (LOIZIDES, P. A.)

Annual Report for 1957, Annexure VIII, Annual Report of the Soils and Chemistry Sections for 1957, 1958, pp. 26.

Progress reports on fertilizer trials with vines, olives, oranges, carobs and apples.

EAST AFRICA HIGH COMMISSION.

Annual Report East African Agriculture and Forestry Research Organisation, 1957, pp. 112, Sh. 3/50.

LOS ANGELES.

Annual Report of the Los Angeles State and County Arboretum, 1956-1957, 1957, pp. 38, illus.

Including notes on responses to GA of *Eranthemum atropurpureum*, papaws and grapes.

MINISTRY OF AGRICULTURE, LONDON.

Experiments in horticulture in progress at experimental horticulture stations, October, 1957-September, 1958, 1958, pp. 107.

A list showing crop, type and object of study, location and duration of experiment and treatments.

MINISTRY OF AGRICULTURE, LONDON.

N.A.A.S. regional experiments in horticulture. Summary of experiments in progress, October 1957-September, 1958, 1958, pp. 47.

Tabulated information.

j MINISTRY OF AGRICULTURE, LONDON, DEPARTMENT OF AGRICULTURE FOR SCOTLAND, AND MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

Output and utilization of farm produce in the United Kingdom, 1946-47 to 1955-56, 1958. pp. 51, H.M. Stationery Office, London, 4s. 6d.

Includes quantities and values for fruit, vegetables and flowers and a few details of separate crops.

k NIGERIA.

Annual Report for the Department of Agriculture, Eastern Region, 1955-56, Enugu, pp. 42, illus., 2s.

l NORTH CAROLINA.

Annual Report School of Agriculture, North Carolina State College, for 1957, 1958, pp. 33, illus.

m PRINCE GEORGE, B.C.

Progress Report Experimental Farm, Prince George, British Columbia, 1952-1956, 1958, pp. 38.

Including brief reports on vegetable crops, fruit variety trials and ornamentals.

n U.S. DEPARTMENT OF AGRICULTURE.

Agricultural statistics 1955.

U.S. Government Printing Office, Washington 25, D.C., 1956, 9×6 in., pp. 610, \$1.75, [received 1958].

Includes data on fruits, vegetables and nuts.

o WALLRABENSTEIN, P. P., AND OTHERS.

Statistics of Hawaiian agriculture, 1957.

Agric. Econ. Rep. U.S. Dep. Agric. 35, 1958, pp. 58.

Mostly for the years 1948-57.

p WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Farm and Experiments, 1958, 1958, pp. 84, map.

Tomato studies; chrysanthemum, fruit and vegetable variety trials; weed control.

